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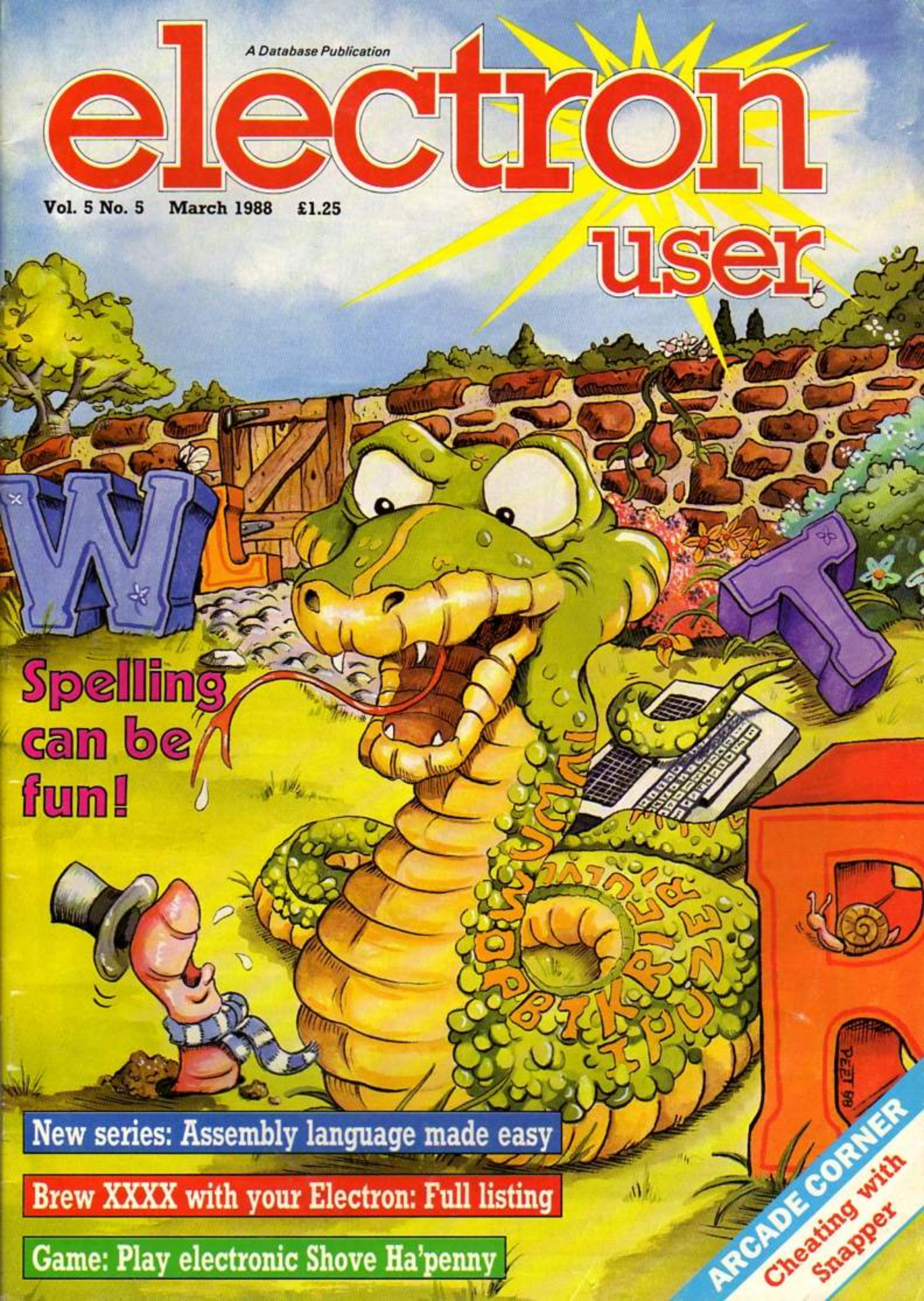

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ARCADE CORNER
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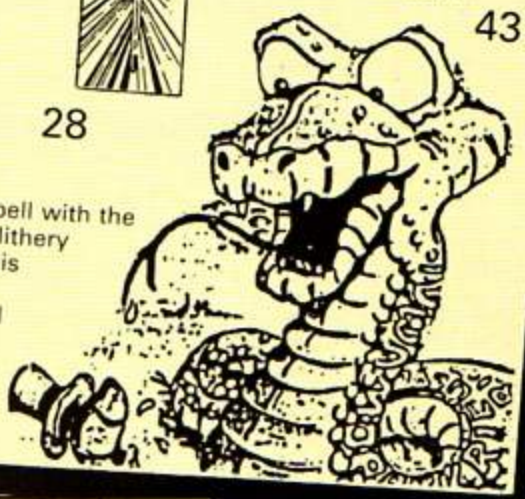

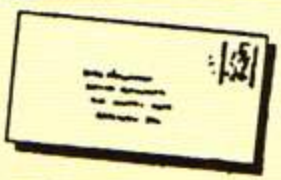

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electron user NEWS

THE SHAPES OF THINGS TO COME

WHAT is claimed to be the first computer game from Russia for the Electron – Tetris – has been released by MirrorSoft.

The package is said to be simplicity itself. A series of different shapes appear one at a time, and by using keyboard or joystick control you have to move and turn the shapes to make them fit together in a line across the bottom of the screen.

As your skill level increases the shapes appear more rapidly. MirrorSoft (01-377 4837) is so confident that Tetris will attract a cult following that it is organising a national competition with a first prize of a trip for two to Russia.

Price £12.95 on cassette

Bugbyte's seeking a new top title

STAND by your computers – the search is on for a sequel to Bug-Byte's highly successful Plan B and Plan B2 games for the Electron.

In fact the titles have been so popular that it has put the company in an embarrassing position as to what to release next.

"We have an excellent development team working non-stop to find a sequel", said Peter Sleeman, Bug-Byte's product development manager. "However, winners like Plan B and Plan B2 are not all that easy to come by.

"New ideas are always welcome. If any *Electron User* readers think they have a game that will make it to the top of the software charts we would like to hear from them".

Bug-Byte (01-439 0666) has been producing quality computer games for the past six years. Top titles for the Electron include Dunjunz, Cricket, Twin Kingdom Valley, Templeton, Jack Attack, Skyhawk, Ice Hockey, and Uranians.

Duncan Lowthian, Bug-Byte's sales manager, said: "The Electron remains an incredibly popular machine and we are committed to producing as much software for it as possible.

"There is still a vast market for the machine and we are always on the lookout for new programs, or even ideas for a program".

So the challenge is on. If you think you can come up with a sure-fire winner on the Electron, Bug-Byte would like to hear from you.

Electron fills the Scouts' bill

IF you are scouting around for a computer to help with all your administration needs, you can't go far wrong with an Electron.

That was the conclusion 17-year-old Tim Parfit of Arundel, West Sussex came to when he was called upon to act as secretary for the local Venture Scout group.

Tim is so committed to the machine that he was one of the first to buy one when they appeared on the market.

From the basic unit he has expanded the kit with a Plus 1 interface and Plus 3 disc drive that he bought on special offer from *Electron User*.

As Venture Scout secretary he is responsible for typing up all the decisions reached at the group's quarterly meetings. All records have to be meticulously prepared, as they contain details of the scouts' activities for the following three months.

Despite some of the excellent word processing packages available for the machine, Tim uses Text Editor – which he copied from the pages of *Electron User*.

Why didn't he use a commercially available program? He said: "I spent a long time typing in the listing and once I got to grips with it I found that it was a doddle to use.

"Other packages are OK, but Text Editor is such a pleasure to use that I see no need to change".

Apart from the minutes of the meetings, sponsor forms for the various fund-raising activities are also produced. "Before I came along with my Electron the group had to rely on anyone who would lend them a typewriter", he said.

"Now with my computer and Centronics GLP printer I am able to produce professional documents in a fraction of the time that it would have taken".

Touchline founder Peter Reynolds

LEAGUE'S FACTS COME FROM THE TOUCHLINE

SCHOOLS, music shops and even a local football league are benefitting from a new information display system for the Electron from Touchline Computers.

The program is the second to be released by the company since its launch six months ago. Since then it has gone from strength to strength by providing top quality, low-priced software.

Based on the same idea as teletext, the Information Display System can be used to create, store and display up to 700 pages of information.

Users can call up from a menu various subsets of information on any topic, either page by page, or on a time delay carousel basis.

The program, which comes on a 3.5in disc with ADFS for £7.95, is suited to establishments where regular updates of information are required.

One store uses the system to display the prices and availability of musical items to shoppers.

By pressing a single key the

Turn to Page 6 ▶

Show stoppers

ONCE again the Electron & BBC Micro User Show – to be held at UMIST, Manchester, March 18 to 20 – will be the launching pad for a host of new products.

Many exhibitors are keeping the wraps firmly on their latest releases, but guarantee that Electron users will find the show well worth a visit.

Jaffa Systems will be introducing a sideways ram and rom board. Fitting into a Plus 1 slot, the board takes eight roms, one of which can be a 32k ram.

The roms are software selectable and can be selected to appear as rom one or two to the Electron.

And for anyone interested in experimenting with music or mice on the Electron, PRES will be unveiling its low-cost 1Mb bus and user port interfaces.

Permanent Memory Systems will be launching several new products at the show, including Multi-Font NTQ printer software specially designed for the Electron.

Electron NTQ has all the features of the BBC Micro version, offering varied height, width, font and pitch – all within one line of text.

Inverse text, backgrounds and underline are also supported, as is micro-justified text. Price £24.95.

PMS will also be offering the NTQ handbook, which explains how to make the most of its Multi-Font software from View, Wordwise and Inter-Word.

All aspects of NTQ are covered in depth, from laying out a document to designing your own fonts. Price – for handbook and disc – £9.50.

And as a special show offer, PMS will be reducing its prices across the board, by as much as 50 per cent.

Ken's hooked on the Electron

THE Electron might seem an unlikely companion to take along on a fishing trip, but Ken Thomas wouldn't be without one.

Ken, secretary of the Welsh Federation of Sea Anglers, Eastern Region, finds the Electron is invaluable when it comes to sorting out the vast amount of paperwork and filing that his job entails.

He relies chiefly on View to carry out all of his word processing needs, although he is able to get through his work a lot faster with the package, he admits that a spell checker is his favourite piece of software.

Ken bought his Electron "in the year dot" and over the years has added a Plus 1, Plus 3, a DMP 2000 and, most recently, Slogger's Master Ram board.

FROM PAGE 5

prospective buyers can find out if the item they are after is in stock, and if required a hard copy of the details can be printed out.

Elsewhere, a school library is using the program to provide on-going information about its books to pupils who may otherwise not be interested in using the indexes.

And a local football league has employed an Electron to display the masses of data about the position of each team in the league.

Touchline (0203 374141) was founded by 17-year-old Peter Reynolds to provide Electron users with useful programs rather than just games. His initial capital was a mere £200 which he won after entering a local business enterprise competition.

"I wanted to start developing software for the Electron because it was a great computer", he said. "As I was unemployed the £200 prize money provided me with the ideal opportunity to set up my own business".

Like many businesses, Touchline has started in a very small way, but it is growing fast.

"There is a tremendous user base out there for the machine and I intend to carry on supplying the right software at the right price", said Peter.

THE GALLUP CHART TOP 10 ELECTRON SOFTWARE

THIS MONTH	LAST MONTH	TITLE (Software House)	PRICE
1	1	AROUND THE WORLD IN 40 SCREENS *Superior*	6.95
2	2	PAPERBOY *Elite*	9.95
3	3	SOCCER BOSS *Alternative*	1.99
4	5	SUPERIOR COLLECTION VOL. 3 *Superior*	9.95
5	6	FOUR GREAT GAMES *Micro Value*	3.99
6	8	CODENAME DROID *Superior*	9.95
7	•	COMBAT LYNX *Alternative*	1.99
8	•	ELIXIR *Superior*	9.95
9	10	MICROBALL *Alternative*	1.99
10	•	STRYKER'S RUN *Superior*	9.95

Compiled by Gallup/Microscope

Software house Superior and the budget house, Alternative seem to have the chart divided between them – yet Elite and Micro Value are holding their own with Paperboy and Four Great Games.

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NEW SERIES

Let's spread the good news

CHRIS NIXON shows how to tap the potential of spreadsheets

VIEWSHEET – available on rom cartridge – is probably the biggest and best known spreadsheet for the Electron. In this short series of articles we'll be taking a look at what it has to offer the serious Electron user.

If you already know the ins and outs of spreadsheets, bear with me for a while as I describe their origin and purpose to the uninitiated.

Not so long ago, accountants sat hunched over enormous, dusty ledgers filled with rows and columns of tightly-quilled, seemingly incomprehensible figures and calculations.

Such were the days when accounting was a highly coveted and closely guarded skill, way back before the advent of computing.

In the late 1970s, when the first affordable home micros appeared on the scene, programmers were more business oriented.

They used languages like Cobol and Fortran, and with these wrote the first spreadsheet programs, which took their name from the large sheets of ruled paper which accountants used to analyse cash flow.

Initially, they were designed so that accountants could transfer their skills to the computer with the minimum of teething troubles, and thus achieve higher turnovers with less strain on pencil and rubber.

However, as the price of computers fell, spreadsheet programs were written for more and more computers. The layman began to avoid the accountant's high fees by employing instead the friendly yet powerful help of the spreadsheet program.

But, I hear you ask, can a spreadsheet really manage my accounts? Is running a small company really possible using one? For the answer to these and many more questions, read on.

In this, and the following articles, I'll be introducing ViewSheet, Acornsoft's very popular spreadsheet, which rose to fame initially on the BBC Micro, but which has been available for the Electron almost since its birth.

We'll kick off with a look at what a spreadsheet actually does, and toward the end of this article I'll set you working on a simple example sheet.

Essentially, a spreadsheet is a computerised version of the accountant's huge ledger. Imagine a book filled with graph paper, ruled into rows and columns.

If the book were a monthly balance sheet, then one column would be headed Date, a second Purpose, a third Debit, another Credit and a final one Balance.

```
 A  SLOT=A1
CONTENTS=*Blank*

0      .......A.......B.......C.......D.......E.......F.......G.......H.......I
.......1>
.......2
.......3
.......4
.......5
.......6
.......7
.......8
.......9
......10
......11
......12
......13
......14
......15
......16
......17
......18
......19
```

Figure I: A blank spreadsheet

You would make entries in a similar way to your bank statement. At the top of the Balance column would be the carried over balance from the previous month.

Then each payment to or from your company would be entered with the date in the appropiate column, while the purpose of the payment would be summarised in the Purpose column and the amount of cash or cheque placed in the Credit or Debit column.

Finally the Balance column would be worked out by taking the previous balance from the row above, adding any credits in the current Credit column and subtracting any debits in the

Debit column. A spreadsheet program works in almost exactly the same way, but allows a great deal more flexibility.

Imagine the dusty ledger full of graph paper again. Taking just one page, imagine labelling the left-hand edge of each row with an identifying row number, working from top to bottom down the page starting at one, then two, three and so on.

Now label the top of each column with a similar identifying letter, working left to right across the page starting with A, then B, C and so on.

What you now have is essentially an empty ViewSheet spreadsheet, ready for some figures to be entered into it.

With your ViewSheet cartridge installed, type:

```
*SHEET
MODE 3
```

This mode limits the number of entries you can place on the sheet, but makes for clearer reading – you really need to see as much of the sheet as possible at one glance.

You should now have a blank screen with a status message at the top left showing your current mode, the number of bytes free and the name, if any, of your current sheet. At the moment this line will just have the words "no file" printed next to it.

This is ViewSheet's command mode. To return to Basic at this point, simply type *BASIC and press Return. Similarly, to re-enter ViewSheet from Basic or another language, use *SHEET.

Things will be looking familiar to View users, but the similarity ends here. Press the Escape key and you will be faced not with an empty text area, but with a screen like Figure I.

Note the horizontal and vertical lines at the top and left of the screen. These are the sheet margins.

To the left and top of these you will see the letters and numbers, which when used together, provide a slot reference.

A slot is simply the name given to an intersection between a row and a column, into which we can place a word or value.

The large white blob is the slot cursor, and shows you which slot you are currently dealing with.

To find out what the current slot reference is, look above the top margin, directly above the cursor itself. You will see the letter A. Inside the left margin, parallel to the cursor, is the number 1.

By placing the letter before the number, we obtain the current slot reference – A1. Now you are halfway to creating your own sheet.

To move the slot cursor around, use Func+S to move one slot left, Func+D to move one slot right, Func+E to move one slot up, and Func+X for the same amount down.

If you have moved to the right hand edge of the screen in your wanderings, you will notice that the cursor will stay in the same place, but the top margin references begin to climb higher through the alphabet.

This is because the screen is only a small window looking on to a much larger sheet – extending sideways and downwards for some distance – and at the moment we are moving this window sideways over the sheet.

To move more quickly in a given direction, use Func+A to move left one screen at a time, Func+F one screen right, Func+R one screen up, and Func+C to move one screen down.

You may have noticed that the sheet extends vertically down to 255, while horizontal movement cycles from A to Z, then AB to AZ, right through to IU, therefore also giving 255 positions.

You are now ready to build a framework sheet and to input some data. An excellent example to practice with, which also illustrates all of the problems you are likely to come across, is a mock-up of a monthly bank statement. Indeed, I use a version of this idea every month as a check against the bank's own tally.

Move the cursor to slot A1. Either use the cursor movement keys, or press Func+8. This key is marked "Goto slot" on your ViewSheet key guide, and after pressing it you simply enter the full slot reference of where you want to be – A1 – and press Return.

Now type Date and press

Turn to Page 10 ►

```
LA  SLOT=A1
CONTENTS=DATE

0       .....A.....B.....C.....D.....E.....F.....G.....H.....I
.....1 DATE    PURPOSE CREDIT  DEBIT   BALANCE
.....2                                  3620
.....3 6 MAR   DISCS           37.8
.....4 8 MAR   PETROL            10
.....5 11 MAR  CHEQUE   57.32
.....6 20 MAR  TAX              689
.....7 29 MAR  REBATE     273
.....8
.....9
.....10
.....11
.....12
.....13
.....14
.....15
.....16
.....17
.....18
.....19
```

Figure II: Entering data

Feature

◀ *From Page 9*

Return. You will see the word Date appear in inverse type at the cursor position – all slots are inverted in this way as the cursor passes over them.

Notice that as you press Return, the line at the top left of the screen which says "contents:*blank*" changes to "contents:Date".

This display of a slot's contents is vital, as the information contained in a slot isn't always displayed exactly as stored. We'll see an example of this later.

Move the cursor right and type Purpose. Note that a slot can, by default, only display the first seven characters of any text typed into it, so it is wise to think of meaningful abbreviations if using lengthy headers.

Move right again and enter the words Credit into slot C1, Debit into D1 and Balance into E1.

Figure II is a more complete version of a statement slip for the month of March, showing how the text entries in your sheet should look.

Type in the rest of them exactly as shown at the slot references given by using the top and side margins as described earlier.

Your bank statement should now look like Figure II. Notice that the only figure in the Balance column is at E2. This is our imaginary carried-over balance from February.

As yet we have not covered using the sheet to calculate anything, but now we must do so in order to fill in the missing slots in the balance column.

The main reason for using slot references the way we do will now become clear. In slot coordinate terms, what we want to put into the next Balance row down could be written as:

```
E2+C3-D3
```

This is known in spreadsheet terms as a formula, although it's actually pretty uncomplicated, and nothing

like what we would expect a mathematical formula to look like.

Check the slot references in the formula against your sheet. What the formula is saying is: Take the carried over balance at slot E2. Add to it any credit which may happen to be in slot C3, and then subtract from this total any debits which may have been entered in slot D3.

This formula is correct for entering directly into ViewSheet, and to do this move to E3, the slot below the carried over balance.

Now type in the formula exactly as shown and press Return. Voilà! Instead of the formula appearing as expected, the slot should show the value 3582.2.

You should now begin to appreciate the power of ViewSheet. Accurate predictions can be made with assurance by entering experimental data, and seeing what ViewSheet churns out at the other end of the formula.

Formulae don't have to be this simple. They can involve whole rows and columns at a time, using multiplication and division as well as addition and subtraction.

You can even make ViewSheet assess a particular result, and carry out a calculation according to its value.

However, for the purposes of our simple sheet we will limit ourselves for the time being to less advanced aspects of the program.

To continue with our statement, see if you can fill in the rest of the sheet. I'll start you off by giving you the next formula for slot E4:

```
E3+C4-D4
```

When you have finished, your sheet should look like Figure III. If not, re-read the article carefully and check the slot contents status line to see if you have used any wrong coordinates. If you are still stuck, the other formulae are:

```
Slot E5: E4+C5-D5
Slot E6: E5+C6-D6
Slot E7: E6+C7-D7
```

Looking carefully at these formulae, you should be able to spot a pattern: They are all identical in every respect, except that the slot references grow one larger vertically each time.

It seems such a waste of effort to have manually duplicated these references for the balance column each time.

Wouldn't it be great if we could have somehow instructed ViewSheet to copy the formulae from slot E3 into slots E4 to E7, but taking their different positions into account?

Well, actually we could have. The process is called replication and we'll see how it works later on in the series.

For now, press Escape and save your work with:

```
SAVE balance
```

● *Next month we'll delve deeper into the world of spreadsheets – by showing you how to run a small software company with ease.*

```
LA  SLOT=A1
CONTENTS=DATE

0       .....A.....B.....C.....D.....E.....F.....G.....H.....I
.....1 DATE   PURPOSE CREDIT  DEBIT   BALANCE
.....2                                 3620
.....3 6 MAR  DISCS           37.8     3582.2
.....4 8 MAR  PETROL            10     3572.2
.....5 11 MAR CHEQUE   57.32          3629.52
.....6 20 MAR TAX                689   2940.52
.....7 29 MAR REBATE     273           3213.52
.....8
.....9
.....10
.....11
.....12
.....13
.....14
.....15
.....16
.....17
.....18
.....19
```

Figure III: The finished spreadsheet

Exploring printers Part 3

PRINTING A PRETTIER PICTURE

JULIA FORESTER presents a letterhead designer in the final part of her printer series

MOST printers can produce graphics to some degree, but how they actually do it varies considerably with individual designs.

As I explained in the first article in this series – in the January 1988 *Electron User* there are three distinct varieties in common use.

Of those, only two can produce graphics to an acceptable resolution – the dot matrix printer and the printer/plotter. The daisy-wheel can't produce graphics at all without changing to special graphics wheels – which are hard to come by and hideously expensive.

The printer/plotter produces graphic output by literally drawing a picture with a series of pens. In fact, plotters draw everything, text included.

In this way they are not really suitable for producing things like listings, documents and so on. Besides which, the software required to draw even a simple screen dump is horrendously complex.

This leaves the ever-useful dot matrix printer, a faithful beast, capable of producing high quality text and graphics almost at the same time. In addition, many dot matrix printers follow a common standard set by the Seiko-Epson corporation. This makes the task of writing a screen dump considerably simpler than it otherwise would be.

Producing screen dumps is where the bit-image or graphics mode comes in. In this mode, the print head fires its pins in an order defined by a binary bit pattern.

Like many of today's computers, the Electron's screen memory is bit-mapped, but because its Basic features the POINT command, there isn't any need to access this memory directly, thus easing the task further.

In fact, all that's necessary is to read the area of the screen to print using a couple of nested FOR ... NEXT loops, convert the information into a format the printer can understand and print it.

The most complex part is, of course, the conversion from screen data to printer data.

To grasp how this is done requires an understanding of bit-image mode itself. This gives you complete control of the print head.

By sending a pattern of bits, individual pins can be made to fire. They fire in a vertical line, eight pins at a time, and as the print head moves horizontally, the picture is made up.

To complicate matters still further, most printers offer a variety of different print densities, from the standard 60 dots per inch to quadrupal density – 240 dots per inch.

Clearly, the more dots printed in the same space the better the quality of the finished article.

The Panasonic KX-P1081 printer offers four distinct eight-pin bit-image modes, standard density, double density, double density – double speed and quadrupal density.

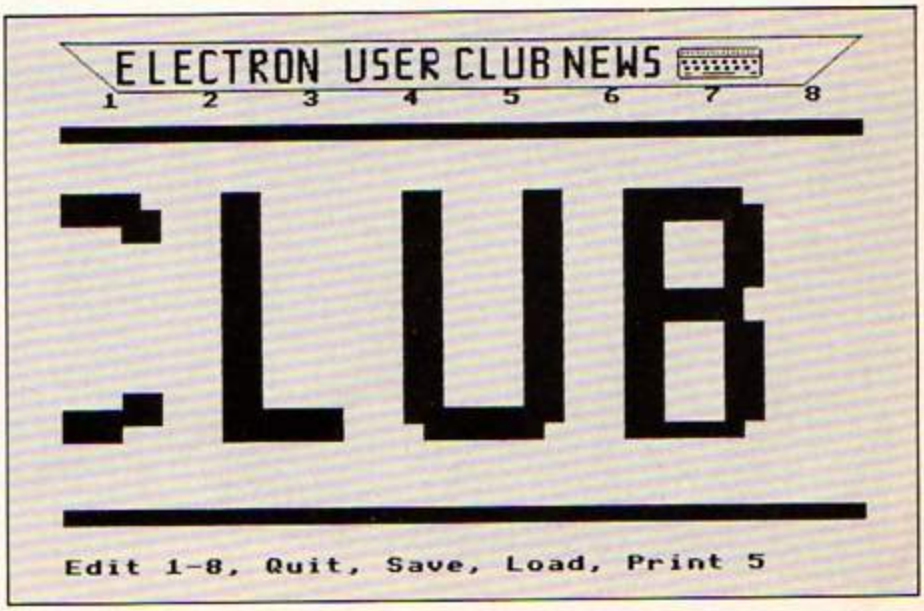
In addition, it offers several nine-pin modes, but the differences are superfluous to our example.

The commands to enter bit-image mode may look a little daunting at first, but they're really quite straightforward.

To take a case in point, consider the command to enter standard density (60 dots per inch) bit-image mode: Esc+"K"+n1+n2

Here, *n1* and *n2* refer to

Turn to Page 12 ▶



Editing the letterhead on screen

Exploring printers Part 3

```
   10 REM Letterhead Generat
or
   20 REM by Julia Forester
   30 REM (c) Electron User
   40 MODE4
   50 fini=0
   60 VDU 23,224:FOR N%=0 TO
 7:VDU 255:NEXT
   70 VDU 224,10,224,10,224
   80 *FX 4,1
   90 REPEAT
  100 PROCdisp
  110 IF G>=0 AND G<=8 PROCe
dit
  120 UNTIL 0
  130
  140 DEF PROCdisp
  150 FOR N%=0 TO 7:PRINT TA
B(N%*5+2,3);N%+1:NEXT
  160 PRINT TAB(0,31)"Edit 1
-8, Quit, Save, Load, Print
";:G=GET:VDU G:G=G-49
  170 X%=G*160:P%=X%
  180 IF G=32 END
  190 IF G=31 PRINT TAB(0,5)
STRING$(40," "):PROCscreen_d
ump:END
  200 IF G=34 THEN *SAVE "HE
ADING" 5800+3C0
  210 IF G=27 THEN *LOAD "HE
ADING" 5800
  220 ENDPROC
  230
  240 DEF PROCedit
  250 A%=0
  260 FOR X%=X% TO X%+159 ST
EP 4
  270 B%=5
  280 FOR Y%=1023 TO 1023-92
STEP -4
  290 PRINT TAB(A%,B%);
  300 IF POINT(X%,Y%) VDU 22
4 ELSE VDU 32
  310 B%=B%+1
  320 NEXT
  330 A%=A%+1
  340 NEXT
  350 PROCkey
  360 ENDPROC
  370
  380 DEF PROCkey
  390 A%=0:B%=5:exit=0
  400 REPEAT
  410 IF INKEY(-122) A%=A%+1
  420 IF INKEY(-26) A%=A%-1
  430 IF INKEY(-58) B%=B%-1
  440 IF INKEY(-42) B%=B%+1
  450 IF INKEY(-2) exit=1
  460 IF A%>39 A%=0
  470 IF A%<0 A%=39
  480 IF B%<5 B%=28
  490 IF B%>28 B%=5
  500 IF INKEY(-99) PROCinvp
ix
  510 PRINT TAB(A%,B%);
  520 TIME=0:REPEATUNTILTIME
>5
  530 UNTIL exit
  540 *FX15
  550 ENDPROC
  560
  570 DEF PROCinvpix
  580 X%=P%+A%*4:Y%=1020-(B%
-5)*4
  590 GCOL 3,1:PLOT 69,X%,Y%
  600 PRINT TAB(A%,B%);:IF P
OINT(X%,Y%) VDU 224 ELSE VDU
 32
  610 ENDPROC
  620
  630 DEF PROCscreen_dump
  640 LOCAL X%,Y%,A%,B%
  650 VDU 2,1,27,1,65,1,8
  660 FOR Y%=1023 TO 1023-92
STEP-16
  670 VDU1,9
  680 VDU 1,19,1,27,1,90,1,0
,1,5
  690 FOR X%=0 TO 1276 STEP
 4
  700 A%=0:B%=128
  710 FOR C%=0 TO 14 STEP 2
  720 IF POINT(X%,Y%-C%) A%=
A%+B%
  730 B%=B% DIV 2
  740 NEXT
  750 FOR N=0 TO 3
  760 VDU 1,A%
  770 NEXT
  780 NEXT
  790 VDU 1,10
  800 NEXT
  810 VDU3
  820 ENDPROC
```

◀ *From Page 11*

the number of points on a line – that is the total number of horizontal pixels that will be sent.

This odd looking format is used because you'll almost certainly want to send more than 255 points.

Since the Electron's printer port is only eight bits wide, numbers greater than 255 have to be sent as two chunks – the low byte followed by the high byte.

To calculate these numbers you must decide how many bits will be sent. This will depend on the graphics mode in use, but for the sake of argument we'll use Mode 4.

This has a screen resolution of 320*256, which means in standard density you'll have to send 320 points for each of the 256 lines.

In double or quadruple density, simply multiply this number by two or four respectively.

Because, this number is bigger than 255, to find *n1* and *n2* (low byte and high byte) you have to do a little calculation thus:

```
n1=320 MOD 256
n2=320 DIV 256
```

Therefore the final command to switch the printer into standard density bit-image mode for a Mode 4 dump is:

```
VDU 2,1,27,1,75,1,64,1,1
```

Remember, the number one preceding each item of data ensures that it's sent just to the printer.

Now all that remains is to send the actual data. This is a simple matter of reading down the screen eight pixels at a time and setting one bit in a byte for every pixel set.

This construct can be defined in a loop – as in lines 710-740 of the accompanying letterhead designer – and is simple enough not to require any explanation here.

The complete dump, converted for quadrupal density can be found in PROCscreen_dump.

The program is a simple editor to produce and print out a fancy letterhead. The screen dump has been modified slightly to give double-height printing and only dump the first three screen lines (six on the printed page).

The number keys from one to eight select the area of screen to be edited. When selected, use the cursor keys to move the flashing cursor, the spacebar to toggle a bit and Control to exit back to the main editor.

While in this mode press Q to finish, S or L to save or load a screen and P to dump the design to a printer.

The finished letterhead printed on a club news sheet

ELECTRON USER CLUB NEWS

A RECORD AGAIN

Electron supplier Superior Software doubled its previous record sales figures last year. And the company also doubled its yearly turnover for the third year in succession. "We're going to try and do it again this coming year", said manager, Steve Botteril.

"About 40 per cent of our sales were due to the tremendous support of the Electron market. We are committed to continuing to supply quality software for the machine as long as there is a demand". Four new games scheduled should have the same impact on the market as Elite, says the company.

Classic collection

Product: Five Star III
Price: £8.95
Supplier: Beau-Jolly, 29A Bell Street, Reigate, Surrey RH2 7AD.
Tel: 0737 222003

THIS is Beau Jolly's third Five Star compilation and, as expected, the games are yet again classic selections from the list of Electron best-sellers. Altogether there are seven games, making up a twin cassette package.

First on tape one is **Southern Belle**, a realistic simulation of an old King Arthur class steam locomotive hauling a passenger train from London to Brighton during the early 1930s. I missed this title at its first release, so I was anxious to find out what it was really like.

As it turned out, I was going to have to wait a while because my Plus 1 caused no end of problems during loading, and eventually had to be completely disabled – the software should do this automatically. The idea behind Southern Belle is simple enough in theory, if not in practice. You must drive the locomotive from London to Brighton, stopping at each station along the way, while observing the proper conventions such as blowing the whistle before entering a tunnel and stopping at signals.

The cassette insert supplied sufficient explanation of the controls to get me going, and I was soon chugging out of Victoria heading over the Thames and towards Battersea power station.

Several things surprised me about Southern Belle. Firstly, each station on the route is represented by detailed line graphics, together with the station's name at the top of the screen.

Secondly, the whole train run is in real-time, which means that each station rolls into view only after the correct mileage has been covered, and it can take over an hour to reach Brighton on a normal run.

The fun begins when you select the Record Run option – this reconstructs the conditions of the famous record-breaking Brighton run in 1903, and you really have to concentrate to perform well. I regularly managed to either blow the pressure plugs or boil the engine dry after only 10 miles or so!

Moving on to the next program, **The Way Of The Exploding Fist** needs no introduction to the vast majority of Electron owners as the original – and some say still the best – martial arts combat game.

I am a Fist fan of long standing, albeit on the BBC Micro. I was pleasantly surprised, therefore, to find the Electron version just as smooth and responsive, and extremely playable.

Fist, although over two years old now, is my favourite out of all the games on the Five Star III tapes. Far from being conducive to causing violent acts, it is a great game with which to work off your aggression.

The keyboard arrangement looks a little bewildering at first. However, your fingers will soon find their way around the 10 player keys with remarkable ease. To win a round, you must either be the first to have scored two full hits, made up from any combination of full or half hits, or have the most hits by the time the 30 second round is over.

The computer player falls down with such a satisfying crunch when hit properly, yet displays uncanny intelligence on the harder levels. Each level appears in the form of a more highly qualified opponent, and the

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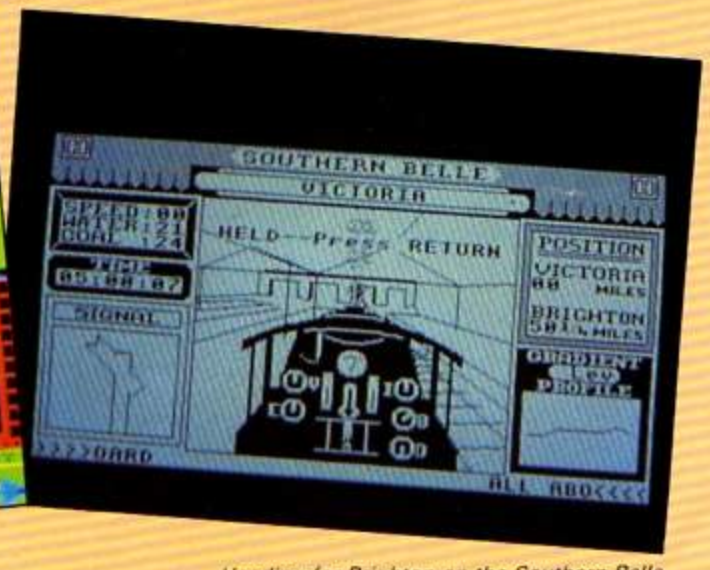
Jetting around in Strike Force Harrier



Heading for Brighton on the Southern Belle

◀ *From Page 13*

reward for vanquishing him is a higher Dan rating. Anyone reaching fourth Dan or higher will have a tough job keeping their status during the ensuing onslaughts.

The third program on the compilation is **Thunderstruck**, an arcade adventure. You play the part of Spreco, the space refuse collector, who has been transported to an eerie castle by a space-time thunderstorm.

All you want to do is get back to Myrtle and the kids, but you are trapped here amongst all manner of medieval trappings, and the only company is a bunch of hostile assistdroids.

These used to be your garbage collection droids, but they are convinced that their incarceration is all your doing and in true Frankenstein form turn on their benefactor.

The castle is inhabited by eight characters, all of whom will help you by supplying useful objects in return for something which they in turn can use. Objects are to be found scattered about the dusty corridors of the castle, and some require careful thought if you intend to pick them up.

I enjoyed this game. The large spaceman sprite moves about smoothly, as do the various characters and other objects. The gameplay was a bit frustrating at times due to the fact that I tend to find arcade adventures a strain on the old grey matter.

Nevertheless, Thunderstruck is a fun game and a worthy inclusion for this compilation tape set.

The next game, **Strike Force Harrier**, marks the start of the second cassette. This is a full-scale flight and battle simulator involving that most famous of jet aircraft, the Harrier Jump-Jet.

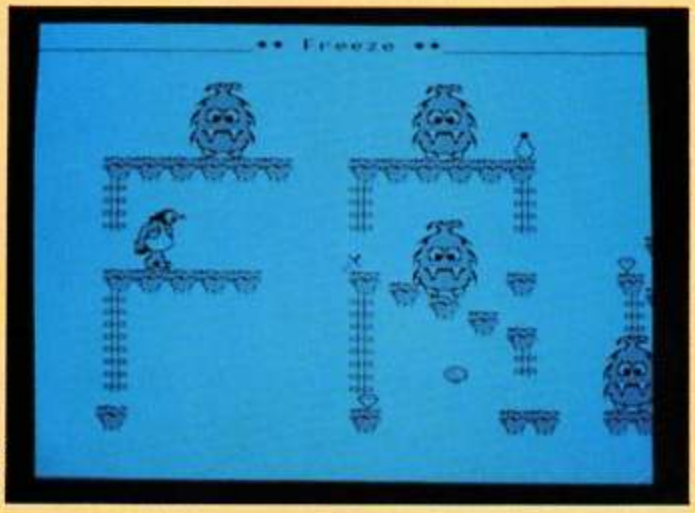
There is a great deal to this game, but briefly you are in control of a Harrier during a large-scale battle. Your objective is to clear the way for ground troops to assault enemy HQ, which is 500 miles to the North-East.

In order to enable the troops' forward movement you must prepare landing sites along the way before signalling the troop carriers to move forward. However, the odd obstacle is ready and waiting to thwart your plans in the shape of SAM surface-to-air missile sites, enemy tanks sporting very accurate artillery, and supersonic jets which are closely modelled on the MIG23.

But all is not lost. You have at your disposal a high-velocity cannon, two Sidewinder infra-red homing missiles and three bombs. The cannon is quite tricky to fire, but effective against tanks.

The sidewinders, on the other hand, are a joy to use. Once you hear the steady growling which signals that a sidewinder has locked on a target, just launch the missile, bank off to one side and watch the fun as it disappears into the distance to be followed by a rewarding explosion.

Riding Kickstart the turtle in Caveman Capers



Playing with your yo-yo in Frak!

Now for the disappointing part. Strike Force Harrier is a brave attempt to bring a successful flight simulator to the Electron, but the view from the cockpit window can become so complex that quite a reduction in speed becomes apparent at these times.

The scrolling movement of the hills is far from smooth for the same reason. One minute you can be flying low, watching the radar and thinking how lovely and flat the horizon looks, when suddenly a 1000 foot mountain appears out of the blue. After a while you learn to give the mountains a very wide margin.

All in all, an excellent battle simulation with all the tactical ingredients necessary for hours of wit-straining fun, let down only by slow screen-handling.

Now on to **Caveman Capers**, game number five. You, as Ogg the caveman, have just found a new form of transport – Kickstart the turtle. Needless to say, Kickstart is far from amenable to the idea of giving anyone a ride, and is doing his best to throw you off balance. This is something at which he is rather adept.

The object of the game is to manage to stay aboard Kickstart while controlling his progress past various obstacles. Holes have to be jumped, pterodactiles dodged, and snakes ducked under as they fly overhead.

Caveman Capers is quite good fun. The characters are large and friendly-looking, especially Ogg, who looks just as if he was taken straight from an animator's table.

I did tire of the whole idea eventually, because although the smoothly scrolling background is always presenting yet more hazards to Ogg in his travels, I just couldn't complete more than the first handful of screens, and there are 60 in all. Still, Caveman Capers is a great fun game where humour is definitely the order of the day.

The next game of the set is a text adventure, **Project Thesius: Rick Hanson 2**. As such adventures on the Electron go, this has got to be one of

the best ever. I simply couldn't believe the amount of detailed, atmospheric description which abounded with every location.

The program was written using a unique text-compression system, and very impressive it is too. The descriptions ranged from 50 to 80 words each, and kept me hooked by the sheer escapism of the game.

Project Thesius is, as the subtitle suggests, the sequel to the first Rick Hanson adventure from Robico. This time the plot involves an unnamed enemy who has secretly made a major breakthrough in particle beam technology, and is currently developing an advanced weapons system, codenamed Project Thesius.

As special agent Rick Hanson you must maintain the balance of power by finding out as much as possible about Project Thesius. You will be taken by submarine to the enemy coastline and left in Fisherman's Cove, The rest is up to you. The submarine will wait offshore until you have completed the mission, whereupon it will take you back to H.Q.

I found Project Thesius immensely enjoyable. Some of the puzzles are infuriating, but I'm sure that the solution was always within my grasp. At one point I was greeted by a particularly officious lady guard who insisted that I'd been swimming – which I couldn't deny – whereupon she announced that swimming was strictly illegal and promptly shot me with her rocket launcher.

That brings us to the last game in this classic collection – the famous **Frak!** by Aardvark. Again, this program needs no introduction as one of the most original, humorous and playable Electron games of all time.

Frak! involves a caveman, several large hairy monsters and a yo-yo. Before you close this magazine in disgust, let me assure you that Frak! is in the best possible taste.

You play the part of the hapless caveman who, armed only with his trusty yo-yo, must find and collect a large key which will allow him to pass on to the next screen.

Each screen is a maze of platforms, ladders and ropes populated by incredibly cute-looking eight foot high hairy monsters which look incredibly gormless. Touching a monster, though, is not recommended as you will lose a life and have to start again from the beginning of the level.

What sent Frak! rocketing to the top of the charts at its original release is probably the funniest idea ever incorporated into a game. To kill the monsters no axe, bow-and-arrow or club is needed. Instead, with a flick of his powerful wrist the wily caveman shoots out his yo-yo which promptly dislodges any monster careless enough to be sitting in its path.

The title of the game comes from a little cartoon bubble containing the word "Frak!", which appears above your caveman's head when he is unlucky enough to touch a monster or fall off a log.

Add to this game three amazing background tunes – and you can quickly see why it was so successful the first time round. In my opinion, it deserves to do well this time too.

There you have it. Seven games, each one a timeless classic, and all for £8.95. Bear in mind that the marks given below are general averages over all the games, as they differ one from another so widely.

Although I had my doubts about one or two of the games at times, as a package Five Star III is pretty unbeatable value.

Chris Nixon

Sound	7
Graphics	8
Playability	9
Value for money	10
Overall	9

Over-priced budget game

Product: Creepy Cave
Price: £1.99
Supplier: Atlantis Software Limited, 28 Station Road, London SE25 5AG.
Tel: 01-771 8642

CREEPY Cave is a budget-priced game from Atlantis where you, as Dirk Daring, must recover your front door key from an evil ghost who nicked it from you one day. Quite what a ghost would want with your front door key, apart from gaining access for a quick spot of haunting, isn't too clear – but the game is quite good fun anyway.

The first thing that greets you when you load Creepy Cave is precisely that – a foreboding picture of a very creepy-looking cave indeed. After the game starts, you must wait for the ghost to float across the first cavern where it begins to leer at you in safety, dangling your door key like a carrot before a donkey.

Infuriated by this show of arrogance, you start out across the cavern floor – and promptly dive head first into a pool of acid. Back at the cave entrance you try again. This time a great leap sails you across the acid to the far shore. Ahh! Now you know how to make that infernal ghost grin from the other side of its ectoplasm. Or do you? With mounting satisfaction you hop from ledge to ledge and finally the opposite side of the cavern is within sight.

With one mighty leap the ghost is before you. Except that you are now in the second cave, and that manic ghost again floats away from you to a safe position, still dangling your key enticingly.

Cave number two is much more interesting, with moving belts to contend with besides the ever-present acid pools. After negotiating a relatively safe path and receiving only a couple more acid baths, again the far end of the cave is reached.

But what's this? Now flaming red-hot chunks of stone are falling from the ceiling and plopping into the acid pools. You begin to wonder whether a quick trip to the key-cutting shop with your spare key might not have been in order after all.

Creepy Cave is quite good family fun. There is no blood and guts, the game is easy to play yet quite addictive, and you never know what surprises the next cave will hold. The story is perhaps a little off-the-cuff, but

who cares? The days when games were sold on a storyline itself are long gone.

For a little less money Creepy Cave would be an excellent buy. As it is, with dozens of great budget games appearing every year, Atlantis may have less of a demand for it than there would have been even as little as a year ago.

Barry Wood

Sound	5
Graphics	6
Playability	7
Value for money	5
Overall	6

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A294

electron user ARCADE CORNER

Compiled by MARTIN REED

EVEN SNAPPIER!

THIS month Arcade corner is devoted entirely to an upgrade for Acornsoft's Snapper, probably one of the longest-lasting games ever seen on the Electron.

The upgrade was originally written for the BBC Micro by Hac-Man, my opposite number at *The Micro User*, but converted for the Electron by David Donaldson of Amersham, Bucks. Regular readers will remember David for the Killer Gorilla mini-upgrade in the October 1987 issue.

Type in the listing exactly as shown, then save it to your own blank cassette using the following procedure:

```
*SPOOL SNAPUP
LIST
*SPOOL
```

This stores the upgrade program in a form in which it can easily be merged with the Basic loader of the original game. To play the upgraded game, first enter:

```
PAGE=&4600
```

then chain the original Snapper tape as normal.

As soon as the Acornsoft title page has been displayed and the *Searching* message has appeared, stop the tape and press Escape. Put your own cassette into the recorder and type:

```
*EXEC SNAPUP
```

Disregard the two *Mistake* error messages at the beginning and end of the merge – everything's fine.

After SNAPUP has finished loading, put the Snapper cassette back into the recorder, press Play and type:

```
GOTO 120
```

The main machine code file, called ?, will then load.

After this has loaded, you will be presented with a menu offering the options of higher starting levels and extra or infinite lives. The game normally awards an extra life at 15000 points: You can now choose not to have this extra life or to have an extra life every 15000 points.

Although you begin on the level selected from the menu (with the chosen number of lives), you can still play the original game. On the high-score page press O to select ordinary mode – a normal game – and P to start the next game in practice mode with the chosen level and number of lives.

Incidentally, the tip given in last month's column for the rom version of Snapper also works on the cassette version. Simply add the following line to the upgrade program before SPOOLing it:

```
145 !&89=RND(0)
```

Well done, David. Watch out for more goodies in next month's Arcade Corner.

Share your hints, tips, peeks and pokes with fellow *Electron User* arcade addicts, but please ensure they are all your own work.

Send them to: Arcade Corner, Electron User, Adlington Park, Adlington, Macclesfield SK10 4NP

Acornsoft Snapper upgrade listing

```
  150 PROCload
  160 MODE 6:VDU 23,1,0;0;0;
0;19,0,4,0,0,0
  170 PROCupgrade
  180 CALL &3400
  190 :
 1000 DEFPROCupgrade
 1010 REM Snapper upgrade
 1020 REM original BBC versi
on by Hac-Man 1987
 1030 REM adapted for Electr
on by David Donaldson 1988
 1040 REM (c) Electron User
 1050 :
 1060 S%=0:L%=2:keyread=&19B
B:level=&3D:lives=&50:yeslif
e=&6A:numex=&7B:sc1=&34:sc2=
&35:sc3=&36:tempsc1=&78:temp
sc2=&79:tempsc3=&7A:bonint=&
15:hidat1=&32C0
 1070 inflife=&112A:ret_bon=
&12D9:pracpatch=&325E:bonpat
ch=&12C5
 1080 B%=0:OS%=S%:OL%=L%:osw
rch=&FFEE:osword=&FFF1:osbyt
e=&FFF4:oscli=&FFF7
 1090 PRINT TAB(9,1);"Snappe
r - The Upgrade"
 1100 VDU 26:PRINT TAB(2,6);
"Normal(Y/N)? ";:G%=GET:IF G
%<>78 THEN PRINT"Yes":GOTO 1
230
 1110 PRINT"No";TAB(0,8);"Pl
ease type the screen no.(1-1
7): ";
 1120 INPUT"A$:IF A$=CHR$(1
3) OR VAL(A$)<1 OR VAL(A$)>1
7 THEN A$="1":PRINT TAB(34,8
);A$
 1130 S%=VAL(A$)-1:REM start
 level
 1140 PRINT"Do you want inf
inite lives(Y/N)? ";
 1150 G%=GET:IF G%<>89 THEN
PRINT"No" ELSE PRINT"Yes":!i
nflife=&00300A9:GOTO 1230:R
EM infinite lives
 1160 PRINT TAB(0,11);"Pleas
e type the no. of lives(1-12
8): ";
 1170 INPUT"A$:IF A$=CHR$(1
3) OR VAL(A$)<1 OR VAL(A$)>1
28 THEN A$="3":PRINT TAB(37,
11);A$
 1180 L%=VAL(A$)-1:REM no. o
f lives in reserve
 1190 PRINT"Do you want an e
xtra life EVERY 15000  poin
ts(Y/N)? ";:A%=GET:IF A%<>89
 THEN PRINT"No" ELSE PRINT"Y
es":B%=1:GOTO 1230
 1200 PRINT"Do you want NO
extra life(Y/N)? ";:A%=GET:I
F A%<>89 OR V%=1 THEN PRINT"
No":GOTO 1230
 1210 PRINT"Yes":?&12CD=&A9
 1220 :
 1230 FOR I%=0 TO 2 STEP 2:P
%=&A00:[OPT I%
 1240 .practice LDX# 0:STX y
eslife:STX numex:\ reset ext
ra life and no. of lives fla
gs
 1250 JSR keyread:LDA &8C:\
```

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Acornsoft Snapper upgrade listing

◀ From Page 17

```
scan keyboard
 1260 .p_check CMP# &37:BNE
o_check:LDX# 1:STX toggle:\
see if 'P' key pressed,if so
 then switch practice mode o
n
 1270 .o_check CMP# &36:BNE
pmode:LDX# 0:STX toggle:\ se
e if 'O' key pressed,if so t
hen switch practice mode off
 1280 .pmode LDX toggle:CPX#
 0:BEQ omode:LDX# S%:STX lev
el:LDX# L%:STX lives:LDX# 0:
RTS:\ set practice mode
 1290 .omode LDX# OS%:STX le
vel:LDX# OL%:STX lives:LDX#
0:RTS:\ set ordinary mode
 1300 .toggle EQUB 1:\ flag
for practice mode on/off
 1310 :
 1320 .bonus LDX sc2:STX tem
psc2:LDX sc3:STX tempsc3:\ c
opy score
 1330 LDX# 0:.bonloop LDA te
mpsc2:SEC:SED:SBC# bonint:ST
A tempsc2:LDA tempsc3:SBC# 0
:STA tempsc3:CLD:BPL next:\
subtract multiples of 15000
from score
 1340 LDA tempsc2:BMI loop_c
heck:BEQ loop_check:\ if res
ult <=0 check for extra life
 1350 .next INX:JMP bonloop:
\ count number of loops
 1360 .loop_check CPX numex:
BNE excheck:\ if number of l
oops greater than last time
make next check on no. of li
ves
 1370 LDA# 0:STA yeslife:\ r
eset 'life already awarded'
flag
 1380 .no_bonus JMP cont:\ n
o extra life - return to gam
e
 1390 .excheck LDA yeslife:B
NE no_bonus:\ check if extra
 life already awarded this l
oop
 1400 INC numex:INC lives:LD
A# &FF:STA yeslife:\ award e
xtra life
 1410 JSR &1832:JSR &17FD
 1420 .cont JMP ret_bon:]:RE
M return to main game
 1430 :
 1440 P%=pracpatch
 1450 !&E1A=&EAEAEAEA:!&E1C=
&EAEAEAEA
 1460 [OPT I%:JSR practice::
]:REM patch for practice mod
e
 1470 IF B%=0 THEN 1500:REM
check if bonus life mode in
operation
 1480 P%=bonpatch
 1490 [OPT I%:JMP bonus:NOP:
]:REM patch for bonus every
15000 points if selected
 1500 NEXT
 1510 :
 1520 $&3558="0-Ordinary mo
de - P-Practise mode"
 1530 :
 1540 REM data for personali
sed high score table
 1550 hidat1!&00=&1000:$(hid
at1+&3C)="Acornsoft"
 1560 hidat1!&03=&2000:$(hid
at1+&50)="Acornsoft"
 1570 hidat1!&06=&3000:$(hid
at1+&64)="Acornsoft"
 1580 hidat1!&09=&4000:$(hid
at1+&78)="Acornsoft"
 1590 hidat1!&0C=&5000:$(hid
at1+&8C)="Acornsoft"
 1600 hidat1!&0F=&6000:$(hid
at1+&A0)="Acornsoft"
 1610 hidat1!&12=&7000:$(hid
at1+&B4)="Acornsoft"
 1620 hidat1!&15=&8000:$(hid
at1+&C8)="Acornsoft"
 1630 hidat1!&18=&9000:$(hid
at1+&DC)="Acornsoft"
 1640 hidat1!&1B=&22478:$(hi
dat1+&F0)="David Donaldson"
 1650 hidat1?&1E=&FC:REM ess
ential fix
 1660 :
 1670 ENDPROC
 1680 :
 1690 DEFPROCload
 1700 !&900=&208D1FA9:!&904=
&8D09A902
 1710 !&908=&0EA90221:!&90C=
&F42004A2
 1720 !&910=&A034A2FF:!&914=
&FFF72009
 1730 !&918=&04A20DA9:!&91C=
&08FFF44C
 1740 !&920=&98488A48:!&924=
&03CAAD48
 1750 !&928=&CA8DFE29:!&92C=
&68A86803
 1760 !&930=&602868AA:!&934=
&000D2E4C
 1770 CALL &900
```

This listing is included in this month's cassette tape offer. See order form on Page 53.

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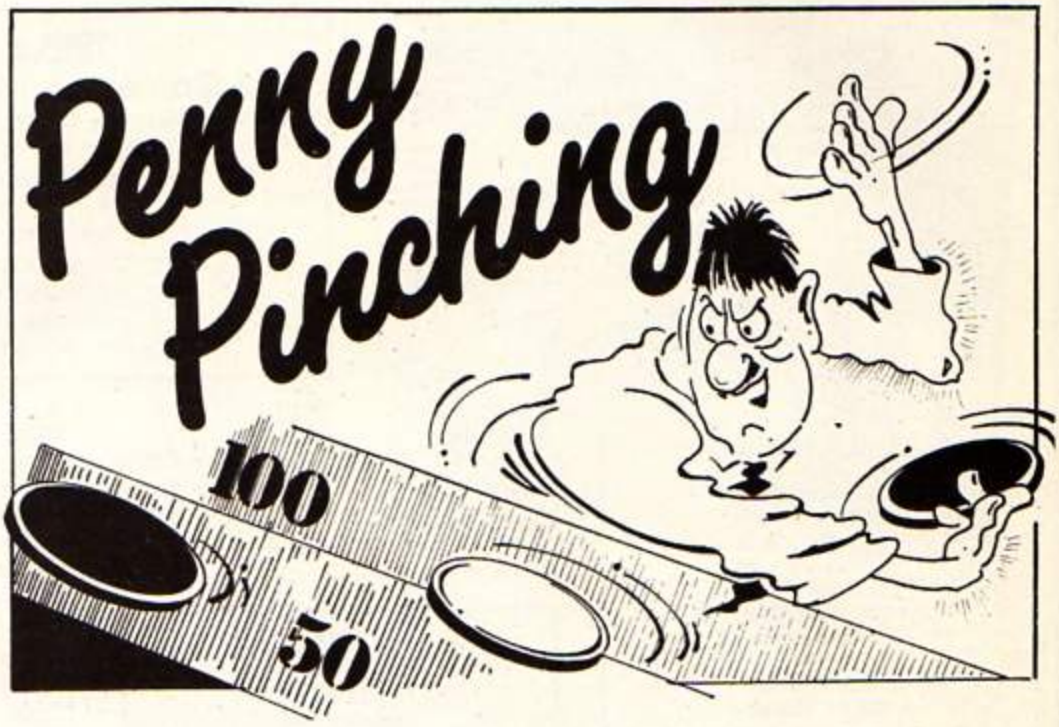
TO ORDER TURN TO THE FORM ON PAGE 53

Penny Pinching



Try pitting you wits against your penny-pinching Electron in CHRIS NIXON's arcade game

GONE are the days when old-timers used to pass the evening at the local public house, playing shove-ha'penny with the youngsters. However, now you can try your hand against your Electron's nimble fingers in this faithful reproduction of the original – but with a difference.

Shove Penny consists of a special playing table divided into different score zones by horizontal lines.

The idea is to place a penny at the front of the table, and use the palm of your hand to shove it across the table top – hopefully to stop between the borders of a score zone.

Your penny must not lie across a zone boundary, nor even touch one, to score the points for that zone. Therefore, a fair amount of skill is needed to place your penny, because the higher scoring zones are at the far end of the table, and are much narrower than the lower scoring zones.

Each player takes it in turn to shove a penny, and the highest scorer wins the round. The player with the highest cumulative score after 20 rounds wins the game.

Your score is displayed at the top right of the screen, in the colour of your counter – blue – with your opponent's below it in red.

At this point I should introduce your opponent – the Electron. Veteran of many a long session at the table, your adversary is no mean player. So you'll have your work cut out to gain the skill necessary to make any impression on its scoring abilities.

Shove too hard and your penny will bounce off the wooden guard at the end of the table and slide back toward the lower scoring areas.

Shove too gently and you won't score highly enough to win – a simple yet subtle set of rules designed to cause much frustration, not to mention costing you the odd naughty wager.

There is a difference with this version of the game, though. Wafer thin counters are used instead of pennies so they glide over each other when a collision would normally have taken place. Therefore a new rule has to be added:

If one player's counter lands on the other's, covering any portion of it at all, then that player will pick up the opponent's score for that round – if any – to add to his own, if any.

This turns the gameplay into quite an aggressive tactical battle. The Electron will always try to cover your counter if you score in one of the top two areas – the 100 point and the 50 point zones.

It won't always manage this, but it does try, and succeeds all too often. Therefore your strategy could be to go for the lower scoring zones where possible so as not to attract the Electron's attention to your counter. But is this best? Try it and see!

Always try to cover the Electron's counter when it has scored highly, as you only have to cover one edge to add his points to your own. It's always worth a try.

After each round the order of play swaps, with the player who went first in the previous round now going second. This gives both players the chance to "huff" the opponent's counter an equal number of times during each game of 20 rounds.

The spacebar is used to control all the action, as your counter will cycle across the bottom of the table continuously, letting you stop it at the best spot.

Wait until it is where you

Turn to Page 21 ▶

VARIABLES

sc%	Player's score
sc1%	Computer's score
p%	Power of current shot
turn%	Number of rounds played
go%	Who goes first
pow%()	Lookup table

PROCEDURES

setup	Set up variable
assem	Assemble machine code
sh	Print shadowed text
power	Power meter routine
scan	Move player's counter

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◄ *From Page 19*

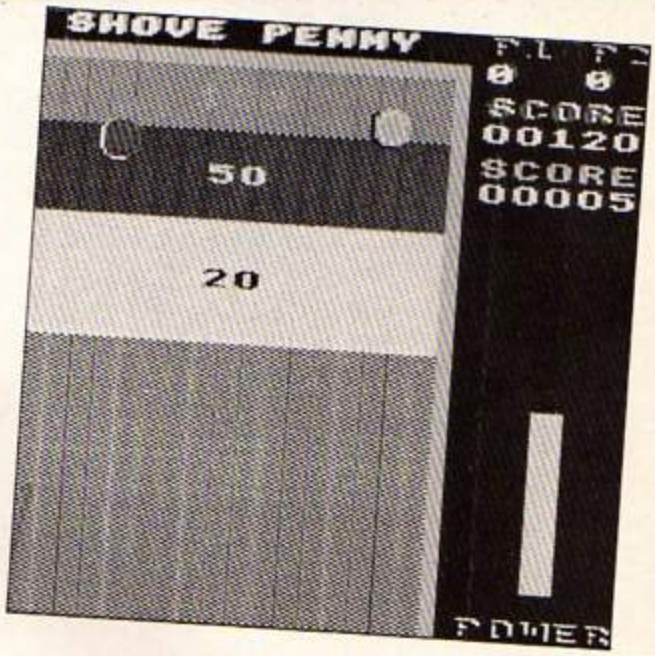
and the power meter on the right of the screen will begin to climb.

When you have collected enough power for the shot, release the spacebar. If you keep it pressed, the power meter will reset to zero and begin climbing again and continue cycling until you release the key. Your counter will be fired, and the computer will calculate your score according to the rules of play.

If either of you lands on the other's counter you will hear a two-tone sound letting you know that extra points have been gained by the top counter.

If you don't hear this sound when the counters are overlapped it means that the lower counter had not scored anyway, and there were no points to be collected by the top counter.

At the end of 20 rounds the computer will add up the scores, awarding the game to the player with most points. You can then begin another game, and it is then up to you to halt the action when a pre-decided number of games have been played. want to fire from, and press space. Hold the key down,




```
  10 REM SHOVE PENNY
  20 REM By Chris Nixon
  30 REM (c) Electron User
  40 REM
  50 IF PAGE=&E00 THEN 100
  60 *FX21,0
  70 *K.0 *T.:MFORI%=0TO(TO
P-PAGE)STEP4:I%!&E00=I%!PAGE
:NEXT:MPAGE=&E00:MOLD:MRUN:M
  80 *FX138,0,128
  90 END
 100 *FX16
 110 MODE2:VDU23;8202;0;0;0
;:PROCsetup
 120 REPEAT:PROCnewgame:REP
EAT
 130 PROCplay:UNTILturn%=20
 140 PROCsq(56,228,11,0,12)
 150 IF sc%>sc1% p1%=p1%+1:
SOUND1,1,50,30:PROCsh("YOU W
IN!",4,1,200,600)
 160 IF sc%<sc1% p2%=p2%+1:
SOUND1,2,150,30:PROCsh("I WI
N!",4,1,250,600)
 170 IF sc%=sc1% p1%=p1%+1:
p2%=p2%+1:SOUND1,3,100,50:PR
OCsh("DRAWN GAME",4,3,180,60
0)
 180 PROCsh("ANOTHER GAME?"
,4,7,50,512):*FX21
 190 REPEAT:G%=GET AND 223:
UNTILG%=ASC"Y" OR G%=ASC"N":
IF G%=ASC"Y" ask%=TRUE ELSE
ask%=FALSE
 200 UNTILNOTask%:END
 210 DEFPROCsetup:PROCassem
:FORL%=0TO &9F STEP8:READV$:
FORC%=1TO(LENV$)/2:B%=EVAL("
&"+MID$(V$,C%*2-1,2)):?(&900
+L%+C%-1)=B%:NEXT:NEXT
 220 p1%=0:p2%=0:DIMpow%(10
):FORL%=1TO10:READpow%(L%):N
EXT
 230 ENVELOPE1,128,1,1,1,50
,50,50,0,0,0,0,0,0:ENVELOPE2
,128,-1,-1,-1,50,50,50,0,0,0
,0,0,0:ENVELOPE3,1,-1,1,-1,1
0,20,10,0,0,0,0,0,0:ENVELOPE
4,128,4,-2,-3,10,20,30,0,0,0
,0,0,0
 240 ENDPROC
 250 DEFPROCnewgame:PROCdrb
d:ps%=0:cs%=0:go%=0:turn%=0:
sc%=0:sc1%=0:PROCheader:ENDP
ROC
 260 DEFPROCdrbd:RESTORE107
0:PROCsq(56,228,3,0,12):PROC
sq(52,216,14,2,24):PROCsq(52
,48,11,2,80):PROCsq(52,36,56
,2,44):PROCsq(52,26,50,2,18)
:PROCsh("SHOVE PENNY",1,3,96
,1023):VDU5:FORL%=1TO4:READx
%,y%,c%,v$:GCOL3,c%:MOVEx%,y
%:PRINTv$:NEXT
 270 VDU4:PROCsh("P1 P2",5,
2,928,1023):PROCsh("SCORE",3
,4,928,927):PROCsh("SCORE",2
,1,928,831):PROCsh("POWER",7
,2,928,96):ENDPROC
 280 DEFPROCplay:IFgo%=0 PR
OCscan:PROCpower:PROCfire:PR
OCrobot ELSE PROCrobot:PROCs
can:PROCpower:PROCfire
 290 PROCdecide:sc%=sc%+ps%
:IF sc%<0 sc%=0
 300 sc1%=sc1%+cs%:IF sc1%<
0 sc1%=0
 310 PROCheader:go%=go% EOR
1:turn%=turn%+1:PROCpause:X
%=?xcopy:Y%=?ycopy:CALLrepla
ce:PROCrestore:ENDPROC
 320 DEFPROCassem:DIMcode%
700:b=&50:screen=&55:data=&5
7:buffer=&70:FORpass%=0TO2ST
EP2:P%=code%:[OPT pass%
 330 .square:LDY #0:LDA b,Y
:STA width:INY:LDA b,Y:STA h
eight:INY:LDA b,Y:STA colour
:INY:LDA b,Y:STA xcoord:INY:
LDA b,Y:STA ycoord:.rowloop1
:JSR convert:LDX width:LDY #
0:.columnloop1:LDA colour:ST
A (screen),Y:CLC:LDA screen:
ADC #8:STA screen
 340 LDA screen+1:ADC #0:ST
A screen+1:DEX:BNE columnloo
p1:LDA colour:PHA:AND rightm
ask:LSR A:STA temp:PLA:AND l
eftmask:ASL A:ORA temp:STA c
olour:INC ycoord:DEC height:
BNE rowloop1:CLI:RTS
 350 .print:STX xcoord:STY
ycoord:ASL A:TAX:LDA lookup,
X:STA data:LDA lookup+1,X:ST
A data+1:JSR convert:LDA #15
:STA height:LDA ycoord:AND #
7:STA temp:LDA #7:SEC:SBC te
mp:STA offset:LDA #0:STA tem
p:LDX #0:.p1:LDA #4:STA widt
h:LDY #0
 360 .p2:LDA (screen),Y:STA
 buffer,X:STA scr:STY temp:T
XA:TAY:LDA (data),Y:LDY temp
:STA spr:AND rightmask:BNE r
nib:LDA scr:AND rightmask:.r
nib:STA leftside:LDA spr:AND
 leftmask:BNE put:LDA scr:AN
D leftmask:.put:ORA leftside
:STA (screen),Y
 370 CLC:TYA:ADC #8:TAY:INX
:DEC width:BPL p2:DEC offset
:BMI newoffset:CLC:LDA scree
n:ADC #1:STA screen:LDA scre
en+1:ADC #0:STA screen+1:.re
enter:DEC height:BPL p1:RTS:
.newoffset:CLC:LDA screen:AD
C #&79:STA screen:LDA screen
+1:ADC #2
 380 STA screen+1:LDA #7:ST
A offset:JMP reenter:.replac
e:STX xcoord:STY ycoord:LDA
 #15:STA height:LDA ycoord:AN
D #7:STA temp:LDA #7:SEC:SBC
 temp:STA offset:JSR convert
:LDX #0:.r1:LDA #4:STA width
:LDY #0
 390 .r2:LDA buffer,X:STA (
screen),Y:CLC:TYA:ADC #8:TAY
:INX:DEC width:BPL r2:DEC of
fset:BMI newoff1:CLC:LDA scr
een:ADC #1:STA screen:LDA sc
reen+1:ADC #0:STA screen+1:.
reenter1:DEC height:BPL r1:R
TS:.newoff1:CLC:LDA screen:A
DC #&79
 400 STA screen:LDA screen+
1:ADC #2:STA screen+1:LDA #7
:STA offset:JMP reenter1:.co
nvert:LDA #0:STA store+1:STA
 screen:LDA xcoord:ASL A:ASL
 A:ROL store+1:ASL A:ROL sto
re+1:STA store:LDA ycoord:AN
D #&F8:LSR A:LSR A:STA scree
n+1:LSR A:LSR A
 410 ROR screen:ADC screen+
1:TAY:LDA ycoord:AND #7:ADC
screen:ADC store:STA screen:
TYA:ADC store+1:ADC #&30
 420 STA screen+1:RTS:.fire
:STX xcoord:STY ycoord:STA p
ower:LDA #0:STA flag:.move:L
DX xcoord:LDY ycoord:JSR rep
lace:LDA flag:BNE movedown
 430 SEC:LDA ycoord:SBC pow
er:CMP #16:BCS nobounce:LDA
#1:STA flag:JMP move:.noboun
ce:STA ycoord:DEC power:BMI
done:LDX xcoord:LDY ycoord:L
DA shape:JSR print:LDY #5:.d
el1:LDX #100:.del2:NOP:NOP:D
EX:BPL del2:DEY:BPL del1
 440 JMP move:.done:LDX xco
ord:STX xcopy:LDY ycoord:STY
 ycopy:LDA shape:JMP print:.
movedown:CLC:LDA ycoord:ADC
power:CMP #240:BCC nobounce:
LDX xcoord:LDY ycoord:JMP re
place
 450 .leftmask:OPT FNequb(&
55):.rightmask:OPT FNequb(&A
A):.temp:BRK:.width:BRK:.hei
ght:BRK:.colour:BRK:.xcoord:
BRK:.ycoord:BRK:.scr1:BRK:BR
K:.store:BRK:BRK:.temp:BRK:.
spare:BRK:.offset:BRK:.lefts
ide:BRK:.scr:BRK:.spr:BRK:.p
ower:BRK
 460 .count:BRK:.shape:BRK:
.flag:BRK:.xcopy:BRK:.ycopy:
BRK:.lookup:OPT FNequw(&900)
:OPT FNequw(&950):.xc1:BRK:.
yc1:BRK
 470 .buffer1
 480 ]:NEXT:ENDPROC
 490 DEF FNequb(N%):?P%=N%
 500 P%=P%+1:=pass%
 510 DEF FNequw(N%):!P%=N%
 520 P%=P%+2:=pass%
 530 DEFPROCsq(w%,h%,c%,x%,
y%)
```

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Shove Penny listing

◀ From Page 21

```
  540 ?b=w%:?(b+1)=h%:?(b+2)
=c%
  550 ?(b+3)=x%:?(b+4)=y%
  560 CALLsquare:ENDPROC
  570 DEFPROCsh(A$,c1%,c2%,x
%,y%)
  580 VDU5:GCOL0,c1%:MOVE x%
,y%:PRINTA$
  590 GCOL0,c2%:MOVE x%-8,y%
-4:PRINTA$
  600 VDU4:ENDPROC
  610 DEFPROCpower:y%=208:x%
=66:p%=1
  620 REPEAT:IFp%<10 PROCsq(
4,12,43,x%,y%) ELSE PROCsq(4
,12,3,x%,y%)
  630 y%=y%-12:p%=p%+1:IFp%=
13 PROCsq(4,144,0,x%,y%+12):
p%=1:y%=208
  640 UNTILNOTINKEY(-99):p%=
(p%+1.5-(RND(3)-2))+10:ENDPR
OC
  650 DEFPROCscan:IF go%=1 X
%=cx%:Y%=cy%:PROCstore
  660 x1%=3:y1%=232:A%=0:REP
EAT:X%=x1%:Y%=y1%:CALLprint:
TIME=0:REPEAT:I%=INKEY(-99):
UNTILTIME=10 OR I%
  670 IF NOT I% CALLreplace:
x1%=x1%+2:IF x1%>48 x1%=3
  680 UNTILI%:SOUND1,-15,150
,2:ENDPROC
  690 DEFPROCfire:SOUND1,4,8
0,10:X%=x1%:Y%=y1%:A%=p%:?sh
ape=0:CALLfire:px%=?xcoord:p
y%=?ycoord:PROCsq(4,144,0,x%
,76):?xcoord=px%:?ycoord=py%
:ps%=FNscore:ENDPROC
  700 DEFPROCrobot:IF go%=0
X%=px%:Y%=py%:PROCstore
  710 FORL%=1TO1000:NEXT:SOU
ND1,4,80,10
  720 IF go%=1 OR (go%=0 AND
ps%<50) X%=RND(45)+4:Y%=232
:A%=pow%(RND(10)) ELSE X%=px
%-3+RND(7)-1:Y%=232:A%=p%+(R
ND(3)-2)
  730 ?shape=1:CALLprint:CAL
Lfire:cx%=?xcoord:cy%=?ycoor
d:cs%=FNscore:ENDPROC
  740 DEFFNscore:y%=?ycoord:
IF y%>18 THENIF y%<28 =100
  750 IF y%>44 THENIF y%<64
=50
  760 IF y%>80 THENIF y%<112
=20
  770 IF y%>128 =5 ELSE =0
  780 DEFPROCdecide:IF NOT(p
x%>cx%-4 AND px%<cx%+4 AND p
y%>cy%-14 AND py%<cy%+14) EN
DPROC
  790 IF go%=0 AND ps%>0 SOU
ND1,-15,248,5:SOUND1,-15,200
,5
  800 IF go%=1 AND cs%>0 SOU
ND1,-15,248,5:SOUND1,-15,200
,5
  810 IF go%=0 cs%=cs%+ps% E
LSE ps%=ps%+cs%
  820 ENDPROC
  830 REM first counter
  840 DATA001A303000053034
  850 DATA3020053403034201A
  860 DATA3030303013A303030
  870 DATA301A383030381A30
  880 DATA3030301A30303030
  890 DATA1A30303030 1A3830
  900 DATA30381A303030301A
  910 DATA3030303005343034
  920 DATA2005303430200001A
  930 DATA3030000005 0F0A00
  940 REM second counter
  950 DATA0009030300040307
  960 DATA0302040703070209
  970 DATA0303030309030303
  980 DATA0309080303080903
  990 DATA0303030903030303
 1000 DATA0903030303090803
 1010 DATA0308090303030309
 1020 DATA0303030304070307
 1030 DATA0204030703020009
 1040 DATA0303000004 0C0800
 1050 DATA20,16,21,10,18,26,
23,21,20,16
 1060 DATA20,21
 1070 DATA352,912,2,100,384,
790,5,50
 2000:NEXT:ENDPROC
 1080 DATA384,625,1,20,416,4
00,2,5
 1090 DEFPROCshow(v%,y%):sc$
=STR$v%:IF LENsc$<5 sc$=STRI
NG$(5-LENsc$,"0")+sc$
 1100 FORL%=1TOLENsc$:IFMID$
(sc$,L%,1)="0" sc$=LEFT$(sc$
,L%-1)+"O"+RIGHT$(sc$,LENsc$
-L%)
 1110 NEXT:PROCsq(20,9,0,58,
255-y%/4):PROCsh(sc$,6,7,928
,y%):ENDPROC
 1120 DEFPROCheader:PROCsq(2
0,9,0,58,9):PROCsh(STR$p1%,4
,3,928,980):PROCsh(STR$p2%,4
,3,1120,980):PROCshow(sc%,88
4):PROCshow(sc1%,788):ENDPRO
C
 1130 DEFPROCstore:FORL%=0TO
79:buffer1?L%=buffer?L%:NEXT
:?xc1=X%:?yc1=Y%:ENDPROC
 1140 DEFPROCrestore:FORL%=0
TO79:buffer?L%=buffer1?L%:NE
XT:X%=?xc1:Y%=?yc1:CALLrepla
ce:ENDPROC
 1150 DEFPROCpause:FORL%=1TO
```

This listing is included in this month's cassette tape offer. See order form on Page 53.

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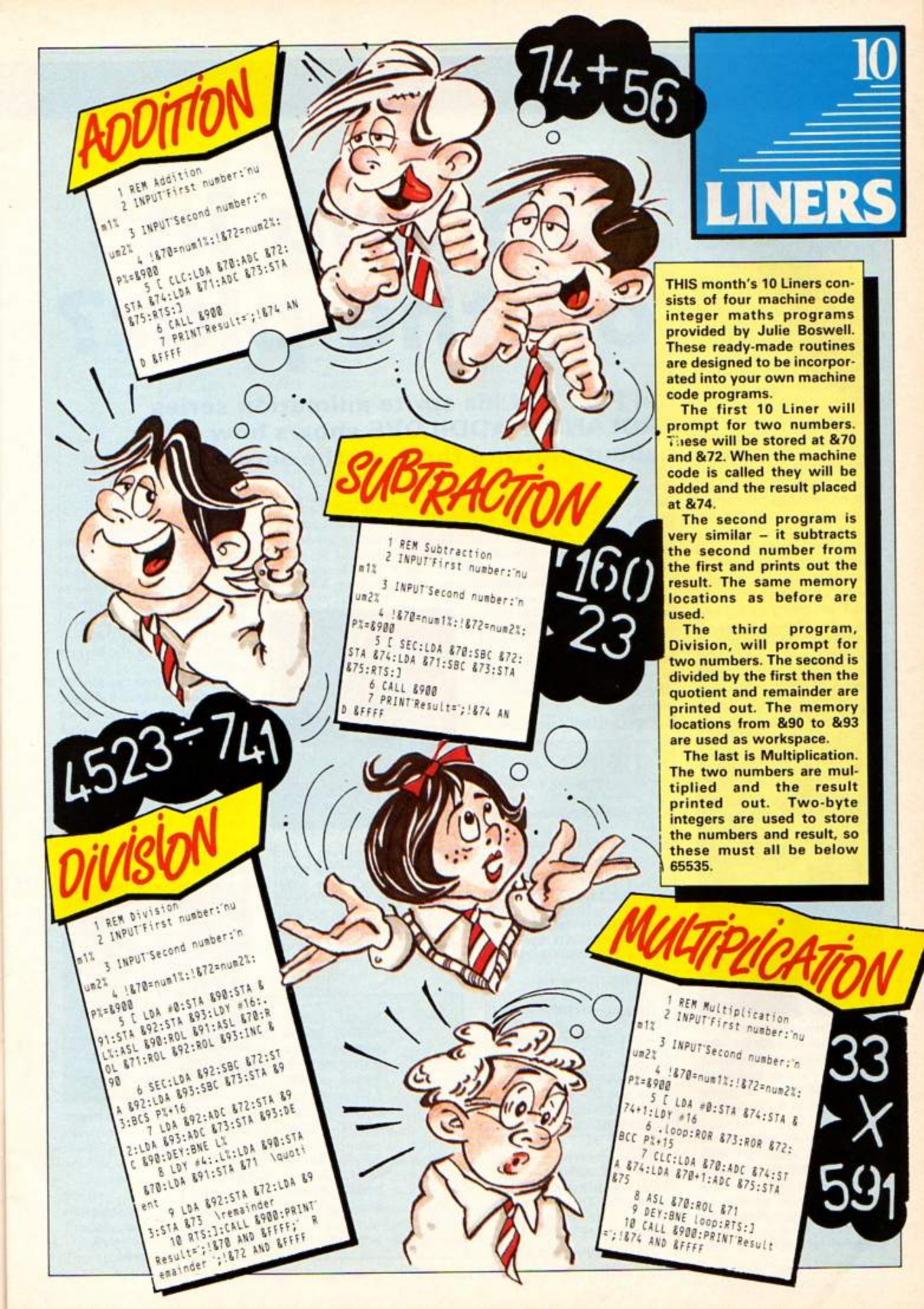
10 LINERS



THIS month's 10 Liners consists of four machine code integer maths programs provided by Julie Boswell. These ready-made routines are designed to be incorporated into your own machine code programs.

The first 10 Liner will prompt for two numbers. These will be stored at &70 and &72. When the machine code is called they will be added and the result placed at &74.

The second program is very similar – it subtracts the second number from the first and prints out the result. The same memory locations as before are used.

The third program, Division, will prompt for two numbers. The second is divided by the first then the quotient and remainder are printed out. The memory locations from &90 to &93 are used as workspace.

The last is Multiplication. The two numbers are multiplied and the result printed out. Two-byte integers are used to store the numbers and result, so these must all be below 65535.

Are you in on the plot?

In Part 2 of his sprite animation series ROLAND WADDILOVE shows how to go about plotting them on the screen

IN this short series we'll be looking at some of the techniques involved in moving characters around the screen.

The characters we'll be using aren't the normal built-in or user defined ones, but are multicoloured sprites of any size or shape, like the ones found in top-selling arcade games.

The sprites will be able to move anywhere on the screen with pixel accuracy and we won't be restricted to normal character print positions as with Basic.

And the techniques used are among the fastest around to achieve the speed necessary for quick-fire arcade shoot-'em-ups.

You'll need to be fairly familiar with 6502 assembly language to follow the programs and routines given, and I am going to assume this is the case.

The machine code will be fairly advanced, but you won't need to fully understand how the routines work – you can get by with simply understanding how to use them (many people can drive a car, but few know how they actually work).

Last month I started the

series by presenting a Mode 5 multicolour sprite designer. This enables you to create any number of sprites, and you can work on up to four frames of animation at once.

The sprite editing grid in the designer can cope with sprites from a minute one pixel by one pixel up to a massive 24 by 32 pixels.

The characters designed are saved to disc (a disc system is essential for machine code games programming) as a series of screen data bytes. The first two bytes hold the width and height.

The sprites can be loaded directly into memory by your machine code program. However, it is often useful to store them as a series of data statements in a separate program, or at the end of the assembly listing.

Program I will take a sprite off disc and convert it into a *SPOOLed file of Basic data statements. This file can be tagged on to the end of a program by *EXECing it.

```
  10 REM Data Maker
  20 MODE 6
  30 INPUT"Sprite file na
me:"sprite$
  40 OSCLI"LOAD "+sprite$+"
 B00"
  50 PRINT"Sprite loaded.
.."
  60 INPUT"Data file name
:"name$
  70 OSCLI"SPOOL "+name$
  80 X%=?&B00:Y%=?&B01:L%=9
020:B%=&B02:a$="9020DATA "
  90 PRINT"9000REM "sprite$
 100 PRINT"9010REM X=";X%;"
/Y=";Y%
 110 FOR I%=0 TO X%-1
 120 FOR J%=0 TO Y%-1
 130 a$=a$+STR$(?B%)+",":B%
=B%+1
 140 IF LEN(a$)>200 OR (I%=
X%-1 AND J%=Y%-1) a$=LEFT$(a
$,LEN(a$)-1):PRINT a$:L%=L%+
10:a$=STR$(L%)+"DATA "
 150 NEXT
 160 NEXT
 170 *SPOOL
```

Program I

The first line will be a REM with the sprite name and the second line will tell you the sprite width in columns and height in rows.

If you have created a sprite with last month's

editor, run Program I and enter the name of the sprite at the prompt. Now enter the name for the *SPOOLed file and it will then be written to disc. The data statements can be *EXECed on to the end of a program at any time.

Having created our sprites using last month's designer and the data maker presented here, it's time to move on to plotting them on the screen. For this we'll need to know how the Electron organises its screen memory.

Figure I shows the top left corner of the Mode 5 screen. Note that as you go down the screen the addresses increment by one quite nicely until the bottom of the first character row.

Then there is a jump of &139 to the next byte on the top of the second character row, and after this they increment by one again till the next row.

Going across the screen there is an eight-byte jump each time.

Armed with this information we can write a

Row 0:	&5800	&5808	&5810	...
	&5801	&5809	&5811	...
	&5802	&580A	&5812	...
	&5803	&580B	&5813	...
	&5804	&580C	&5814	...
	&5805	&580D	&5815	...
	&5806	&580E	&5816	...
	&5807	&580F	&5817	...
Row 1:	&5940	&5948	&5950	...
	&5941	&5949	&5951	...
	&5942	&594A	&5952	...
	&5943	&594B	&5953	...
	...	...	...	...
	...	...	...	...

Figure I: The top left corner of the Mode 5 screen

```
10REM Simple Print
20PROCassemble
30MODE 5
40CALL &900
50END
60
70DEF PROCassemble
80new=&70
90temp=&72
100rows=&74
110temprows=&75
120columns=&76
130FOR pass=0 TO 2 STEP 2
140P%=&900
150[ OPT pass
160
170\new=screen address
180LDA #&5000 MOD256
190STA new
200LDA #&5000 DIV256
210STA new+1
220
230\newdata=sprite addr
240LDA #sprite MOD256
250STA newdata+1
260LDA #sprite DIV256
270STA newdata+2
280
290\X=width,Y=height
300LDX #4
310LDY #32
320JSR print
330RTS
340
350.print
360 STX columns
370 STY rows
380 LDX #0
390 LDY #0
400 LDA new
410 STA temp
420 LDA new+1
430 STA temp+1
440.loop1
450 LDA rows
460 STA temprows
470.loop2
480.newdata
490 LDA &3000,X
500 STA (new),Y
510 INX
520 LDA new
530 AND #7
540 CMP #7
550 BEQ bottom
560 INC new
570 BNE next
580 INC new+1
590 JMP next
600.bottom
610 LDA new
620 ADC #&38
630 STA new
640 LDA new+1
650 ADC #1
660 STA new+1
670.next
680 DEC temprows
690 BNE loop2
700 LDA temp
710 ADC #8
720 STA new
730 STA temp
740 LDA temp+1
750 ADC #0
760 STA new+1
770 STA temp+1
780 DEC columns
790 BNE loop1
800 RTS
810
820.sprite
830]
840NEXT
850FOR i=0 TO 127
860READ ?P%
870P%=P%+1
880NEXT
890ENDPROC
900
910REM SPRITE
920REM X=4/Y=32
930DATA 0,0,0,0,0,0,0,0,0,0,
0,0,0,17,17,0,0,17,17,17,0,0
,0,0,0,0,1,1,3,207,207,238,1
19,3,7,15,45,60,60,60,52,48,
48,255,255,85,85,221,221,102
,102,186,184,253,15,15,14,14
,13,13,11,9,0,17,0,0,8,12,19
2,96,192
940DATA 192,128,0,0,0,136,
136,204,204,204,204,204,136,
136,0,0,0,0,8,12,12,14,63,12
7,238,204,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,136,0,0,0
```

Program II

machine code routine to plot our sprites. Program II is a demonstration which prints a large sprite on the screen.

Enter it, save it, then run it – the machine code will be

assembled and called, displaying a single frame of a walking man on a Mode 5 screen.

The method used by the sprite print routine – labelled *print* – is to draw the character column by column, each one byte wide. The sprite data is stored in the data statements starting at line 930 (created by Program I) and the size is stored in line 920.

As you can see, *X* is four and *Y* is 32 so the sprite is four columns wide and 32 rows deep. The *print* subroutine consists of two loops – an outer and an inner. Written in pseudo code it would look like:

```
FOR column=1 TO 4
FOR row=1 TO 32
Get byte of data
Store it in screen ram
NEXT row
NEXT column
```

The screen address is incremented by one for each row in the inner loop and the bottom of a character row is detected by ANDing the low byte of the address with seven, then comparing it with seven. If it is equal to seven then an extra &138 is added to the address to move on to the next screen row.

Before calling the print routine it is necessary to set up several variables. The address to print the sprite at should be stored in *new*, the sprite data address in *newdata*+1 and the X and Y registers loaded with the width and height before calling *print*.

Line 490 is unusual – this is the line which picks up the sprite data from memory:

```
490 LDA &3000,X
```

It assembles to:

```
BD 00 30
```

The sprite data address is poked into the second and third bytes – 00 30 – *newdata*+1 and *newdata*+2. The reason for using this method is that this is an absolute indexed instruction taking just four cycles. We could have used something like:

```
LDA (sdata),Y
```

but at five cycles this is slightly slower and would involve extra code to boot.

As it stands, the print routine simply pokes the sprite data directly to the screen. This means that any background stored underneath it will be destroyed. Furthermore, we haven't yet got a method of removing the sprite from the screen.

These minor difficulties are easily circumvented by adding the following lines to Program II:

```
44 G=GET
46 CALL &900
495 EOR (new),Y
```

Now the sprite data will be EORed with the screen. Run the program and when the character is printed, press a key to erase it – the machine code is called

again to EOR the data with the screen a second time.

Now you've got a routine to print and erase sprites on the screen, moving one around is a simple matter of printing it at one position, erasing it and printing it again at another position.

Moving a sprite by calling *print* to erase it then *print* again to redraw it at the new position is rather slow and long winded. It is much better to combine the two operations – erase and re-draw at the same time.

Program III shows how this is achieved. It contains a similar, but slightly modified *print* routine. Enter it, save it and run it. Press a key to move the sprite. A lot of

Turn to Page 27 ▶

Plan B2 - The "Red-hot sequel" to Plan B, the Electron User Golden Game.

"It is probably the best showcase of what your Electron can achieve that I have ever seen" Quote from Electron User, February 88.

Sound	10
Graphics	10
Playability	10
Value	10
Overall	10

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◀ *From Page 25*

initialisation is required before *print* can be called as quite a few variables have to be set.

The old address of the sprite is stored in *old*, the new address in *new*, the old data (frame one of the animation sequence) in *olddata*+1, and the new data (frame two) in *newdata*+1. The size is passed in the X and Y registers. (Program III uses the same frame twice so there isn't any animation).

To put the sprite on the screen initially, *put* is called. The old address and data aren't important, and all you need to do is set the new address and data.

Finally, Program IV contains a routine called *convert* which will convert an x,y coordinate into a screen address. These aren't the normal graphics coordinates however, but are based on a 40 by 256 screen with the origin in the top left corner of the display. This is the byte size of the screen – 40 bytes across by 256 down.

Type in Program IV and run it. Enter the x and y coordinates at the prompts and the address will be printed out. Stick to within the screen limits otherwise you'll just get a nonsense address.

● *There is enough material here to keep you going till next month, when I'll show how to move sprites in front or behind other objects on the screen without affecting them in any way.*

```
  10 REM Get screen address
  20 PROCassemble
  30 PRINT
  40 INPUT"X coordinate",X%
  50 INPUT"Y coordinate",Y%
  60 CALL &900
  70 PRINT"Address=&";~!&70
AND &FFFF
  80 END
  90
 100 DEF PROCassemble
 110 temp=&70
 120 FOR pass=0 TO 2 STEP 2
 130 P%=&900
 140 [ OPT pass
 150
 160 \X,Y --> address
 170 .convert
 180 LDA #0
 190 STA temp+1
 200 TXA
 210 ASL A
 220 ASL A
 230 ROL temp+1
 240 ASL A
 250 ROL temp+1
 260 STA temp
 270 TYA
 280 AND #7
 290 ADC temp
 300 STA temp
 310 LDA temp+1
 320 ADC #0
 330 STA temp+1
 340 TYA
 350 LSR A
 360 LSR A
 370 LSR A
 380 ASL A
 390 TAY
 400 LDA table,Y
 410 ADC temp
 420 STA temp
 430 LDA table+1,Y
 440 ADC temp+1
 450 STA temp+1
 460 RTS
 470
 480 .table
 490 OPT FNtable
 500 ]
 510 NEXT
 520 ENDPROC
 530
 540 DEF FNtable
 550 FOR I%=0 TO 31
 560 [OPT pass
 570 EQUW &5800+I%*&140
 580 ]
 590 NEXT
 600 =pass
```

Program IV

```
  10 REM Simple Print
  20 PROCassemble
  30 MODE 5
  40 CALL &900
  50 END
  60
  70 DEF PROCassemble
  80 new=&70
  90 old=&72
 100 temp=&74
 110 temp1=&76
 120 rows=&78
 130 temprows=&79
 140 columns=&7A
 150 FOR pass=0 TO 2 STEP 2
 160 P%=&900
 170 [ OPT pass
 180
 190 \put sprite on screen
 200 LDA #&5D00 MOD256
 210 STA new
 220 LDA #&5D00 DIV256
 230 STA new+1
 240 LDA #sprite MOD256
 250 STA newdata+1
 260 LDA #sprite DIV256
 270 STA newdata+2
 280 LDX #4
 290 LDY #32
 300 JSR put
 310
 320 \wait for key
 330 JSR &FFE0
 340
 350 \move sprite
 360 LDA #&5D20 MOD256
 370 STA new
 380 LDA #&5D20 DIV256
 390 STA new+1
 400 LDA #sprite MOD256
 410 STA newdata+1
 420 LDA #sprite DIV256
 430 STA newdata+2
 440 \old screen address
 450 LDA #&5D00 MOD256
 460 STA old
 470 LDA #&5D00 DIV256
 480 STA old+1
 490 LDA #sprite MOD256
 500 STA olddata+1
 510 LDA #sprite DIV256
 520 STA olddata+2
 530 LDX #4
 540 LDY #32
 550 JSR print
 560 RTS
 570
 580 .put
 590 LDA #&80
 600 STA old
 610 STA old+1
 620
 630 .print
 640 STX columns
 650 STY rows
 660 LDX #0
 670 LDY #0
 680 LDA new
 690 STA temp1
 700 LDA new+1
 710 STA temp1+1
 720 LDA old
 730 STA temp
 740 LDA old+1
 750 STA temp+1
 760 .loop1
 770 LDA rows
 780 STA temprows
 790 .loop2
 800 .newdata
 810 LDA &3000,X
 820 EOR (new),Y
 830 STA (new),Y
 840 .olddata
 850 LDA &3000,X
 860 EOR (old),Y
 870 STA (old),Y
 880 INX
 890 LDA old
 900 AND #7
 910 CMP #7
 920 BEQ bottom1
 930 INC old
 940 BNE next1
 950 INC old+1
 960 JMP next1
 970 .bottom1
 980 LDA old
 990 ADC #&38
1000 STA old
1010 LDA old+1
1020 ADC #1
1030 STA old+1
1040 .next1
1050 LDA new
1060 AND #7
1070 CMP #7
1080 BEQ bottom2
1090 INC new
1100 BNE next2
1110 INC new+1
1120 JMP next2
1130 .bottom2
1140 LDA new
1150 ADC #&38
1160 STA new
1170 LDA new+1
1180 ADC #1
1190 STA new+1
1200 .next2
1210 DEC temprows
1220 BNE loop2
1230 LDA temp1
1240 ADC #8
1250 STA new
1260 STA temp1
1270 LDA temp1+1
1280 ADC #0
1290 STA new+1
1300 STA temp1+1
1310 LDA temp
1320 ADC #8
1330 STA old
1340 STA temp
1350 LDA temp+1
1360 ADC #0
1370 STA old+1
1380 STA temp+1
1390 DEC columns
1400 BNE loop1
1410 RTS
1420
1430 .sprite
1440 ]
1450 NEXT
1460 FOR i=0 TO 127
1470 READ ?P%
1480 P%=P%+1
1490 NEXT
1500 ENDPROC
1510
1520 REM SPRITE
1530 REM X=4/Y=32
1540 DATA 0,0,0,0,0,0,0,0,0,0
,0,0,0,17,17,0,0,17,17,17,0,
0,0,0,0,0,1,1,3,207,207,238,
119,3,7,15,45,60,60,60,52,48
,48,255,255,85,85,221,221,10
2,102,186,184,253,15,15,14,1
4,13,13,11,9,0,17,0,0,8,12,1
92,96,192
1550 DATA 192,128,0,0,0,136
,136,204,204,204,204,204,136
,136,0,0,0,0,8,12,12,14,63,1
27,238,204,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,136,0,0,0
```

Program III

By Pendragon

You'll be bewitched by stormy Cornwall

I MUST tell you about a fabulous new release from Larsoft, entitled simply, Hex. This, as all Classics scholars will know, is the Greek word for six, and is the sixth adventure to spring from the pen of that master of the Quill, Geoff Larsen.

The action is centred in and around a small Cornish fishing village circa 1900. The area is rich in folklore and superstition is rife.

Centuries previously a witch known as Vianna had lived in the area. On certain stormy nights, or when the moon is full, Vianna is reported to return from the dead to stalk the night.

She is also supposed to conjure up demons and familiars to assist her in her unholy deeds.

People have reported hearing strange whistles and voices in the dark, with no visible persons being apparent. Footsteps have been heard and the whinnying of horse-like creatures has occasionally come from thin air.

You play the part of a travelling stranger who arrives in the village on just such a night, and unwillingly becomes caught up in the strange events which follow.

If you wish to know more, I suggest that you rush your order to Larsoft now!

As with all Larsoft adventures, the background has been thoroughly researched for authenticity by Mr Larsen. The adventure reeks of atmosphere and the appetite is whetted for Geoff's machine code epic which he is currently writing for Robico.

Wychwood, Nine Dancers and **The Puppet Man** are still available from Larsoft, priced £3.95 each and as such are masterpieces which should not be missing from any text adventure collection.

Geoff's first adventure, a two-parter entitled **The Rising of Salandra** is an absolute classic and retails at a bargain £4.95.

In a matter of only one year, Larsoft has firmly ensconced itself as one of the leading text adventure software houses for the Electron, along with the supreme Robico, Epic and Shards.

In my opinion Electron adventures are now outstripping BBC Micro adventures for originality, atmosphere and playability.

Just compare three recent Electron releases, **Hex, Village of Lost Souls** and **The Hunt** with the cream of BBC newies, the dire **Yes Prime Minister**, the awful **Not a Penny More Not a Penny Less** and the abysmal **The Archers**, and you will see what I mean.

No wonder, following my review in *The Micro User* of **Epic's Lost Crystal**, BBC Micro owners have clamoured for, and obtained, a conversion for their machine of this all-time Electron classic.

We may have a smaller user-base than our BBC brother, but above all, Electron users are clannish, loyal to their machine and support good software.

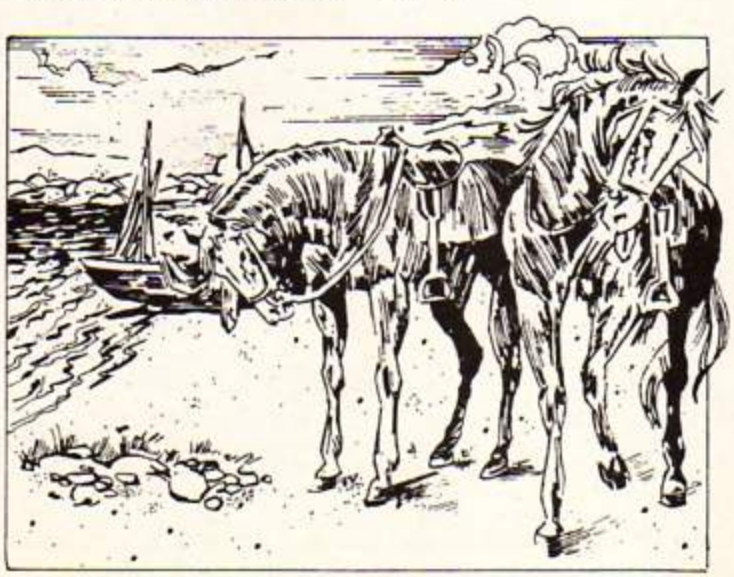
This month I begin serialising in Hall of Fame a complete solution to **Operation Safras**. This is particularly for the pupils of Wigmore High School, who en masse seem stuck with every aspect of this Shards riddler.

Also I have given **Enthar Seven** a break this month as it seems to have been running for an eternity, but don't worry, next month will see the continuation of this giant solution for an even bigger adventure.

Until the midnight oil burns low, happy adventuring.

Adventurer's Glossary (continued from last month)

Earth-stone: A symbol of power and good.
Eggs: Could be a chicken's, but more likely a dragon's, so take care.
Elephant: They're frightened of mice.
Elevator: Present in a number of adventures. Usually some obscure method of operation – a bit of experimentation is probably called for.
Elixer of Life: Try drinking it.
Elves: Usually friendly, but often mischievous and certainly magical.
Emerald: Almost certainly a treasure.
Entrance: Usually plenty of these in most adventures. Could be booby-trapped, or you may need a magic key or password.
Eternal Passages: Bound to be a maze, or at least a bit confusing.
Evil Eye: Evil beyond imagination – must be destroyed.



Readers' Hall of Fame

Operation Safras – *Harry Bastien*

This solution only gives the elementary actions. The passwords, clues and more subtle actions are left for you to discover:

LONDON – EXAMINE LIFT – EXAMINE MAN – ASK MAN – EAST – GET FIVER – GO TO BRISTOL – EXAMINE SEAT IN COACH – GIVE FIVER TO TRAMP – GO TO COVENTRY – EXAMINE CART – GO TO LIVERPOOL – GET KEY – ASK MAN AT BAR.

GO TO ABERDEEN – BLOW NOSE IN SHOP – GO TO DUNDEE – BREAK GLASS – ENTER WINDOW – EXAMINE COMPUTER – TYPE RU – EXAMINE VAULT – GET TRIPP.

GO TO OXFORD – ENTER FARMHOUSE – EXAMINE ROOM – GO TO EXETER – EXAM KEY – OPEN LOCKER 21 – GET EGG – GET NOTE – READ NOTE.

GO TO NEWPORT – EXAM TREES – EXAM CROSS – EXAM HOLE – GET BOTTLE – GO TO PLYMOUTH – EXAM CAVE.

GIVE BOTTLE TO LADY – GO TO ABERDEEN – GIVE EGG TO MAN – GO TO COVENTRY – SCRATCH EAR – READ PAMPHLET.

Philosopher's Quest – *John Tipper*

When you start off you will need the rod, keys and aqualung from the shop. Take the rod and throw it. Now you can safely get the other two items. Once outside the shop type GET twice to obtain the rod and lamp. Now use ON to switch on the light and you can move about safely.

Go South and throw the rod to prevent the wall from crushing you. Carry on South until you reach the beach. Drop the aqualung and go West along the beach. Go Northwest to the bungalow and open the larder with the keys and enter.

Get the cup of tea, leave the larder and go North into the sitting room. A lady will tell you about her dog then shoo you out. Go to the location outside the shop then Go East. Get the amulet and then think. Go down, then go North and rub the amulet to raise the drawbridge.

Continue North in the following way: JUMP NORTH, GET MASK, CRAWL NORTH, GET TROPHY, HOP SOUTH, RUN SOUTH, SOUTH to reach Picadilly Circus. A random move generator operates here, so experiment with NE, NW, SW, and SE.

Leave the matches for the time being, but get the cheese. Drop your treasures in the shop on the way back. As soon as you have got the cheese, go to the beach. You must now drop the cheese and move away from it every three moves to prevent yourself from choking on the foul stench.

Problems Solved

Lady Fee, Clive Mahoney and James Farmer are all stuck at various points in Micropower's **Adventure**. Clive needs to say OPEN SESAME to open the closed cavern door at the start.

Lady Fee must kill the spider with the axe, turn off her lamp and HOOT to get rid of the rat.

James should steal a treasure to get thrown into the dungeons, but should ensure that he has his keys with him first.

James is also stuck in **Escape from Pulsar Seven**. This is a game which I have not seen; can anybody help with a full solution?

Clive needs help with an age-old problem in **Stranded**. You must get the gun then JUMP and SHOOT to kill the robot.

In the **Stolen Lamp** you must be brutal, as I suggested last month, but should also drop the grenade and get the red herring before acquiring some of the treasures, Clive.

Andrew Young cannot seem to get started in **Wychwood**. Use the credit card to open the cabin door and fill the bucket at the pond.

Straighten the paper clip and use it with the newspaper to pick the lock of the front door. That should get you into the adventure.

This may also help Mark Deehan who should also FEEL and PULL CORD when in the dark under the trapdoor.

Mark is also flummoxed at the end of the **Nine Dancers**. You should talk to the princess, get the garland and a galleon will provide your transport to the island.

In **Myorem**, Mark must make a catapult from the bandage and forked stick in order to frighten the puma.

A number of readers who have written in are stuck with some of the ingenious puzzles in Tynesoft's **Oxbridge**. To reach the island you must embark in the punt.

Once equipped with the punt pole, ordinary direction commands will manoeuvre the punt round to the pub jetty where you may safely step ashore. But take care not to cross via the No Entry bridge.

Do not disembark at the No Punters jetty. Avoid the low bridge and also avoid the temptation to catch the crab.

To work the service till in the bank you will need the card from the dining hall. You must also have taken note of the numbers written on the blackboard in the maths lecture theatre.

The ID number is the missing term in the sequence. INSERT CARD, wait, 2101, wait, TAKE WAD. To avoid trouble with the manager troll, refrain from visiting his office.

Vic Robinson and Fiona Reynolds among many, have asked for the significance of the Rector's Bible in **Village of Lost Souls**. Find the Rector's Bible and act on the information therein.

Take the Bible, read it, get the parchment, read it, drop it, D, NW, KNEEL, PRAY, STAND, EXAMINE ALTAR. You should now get some of the objects requested.

Robert Henderson has written to mention a useful bug in **Denis through the Drinking Glass**. You can hide in the cupboard for innumerable moves to escape Maggie's clutches.

Has anyone finished this adventure yet?

Bill Trevelyan has also written to say that the decompiler for Melbourne House adventures which I printed in the November 1987 edition of this column will not work with **Dodgy Geezers**.

This is apparently because the adventure holds its vocabulary in compressed cryptic form.

Bill suggests the following short program should be used to print out the game's vocabulary.

First set PAGE to &5600 and then *LOAD D2 if you're

Turn to Page 30 ►

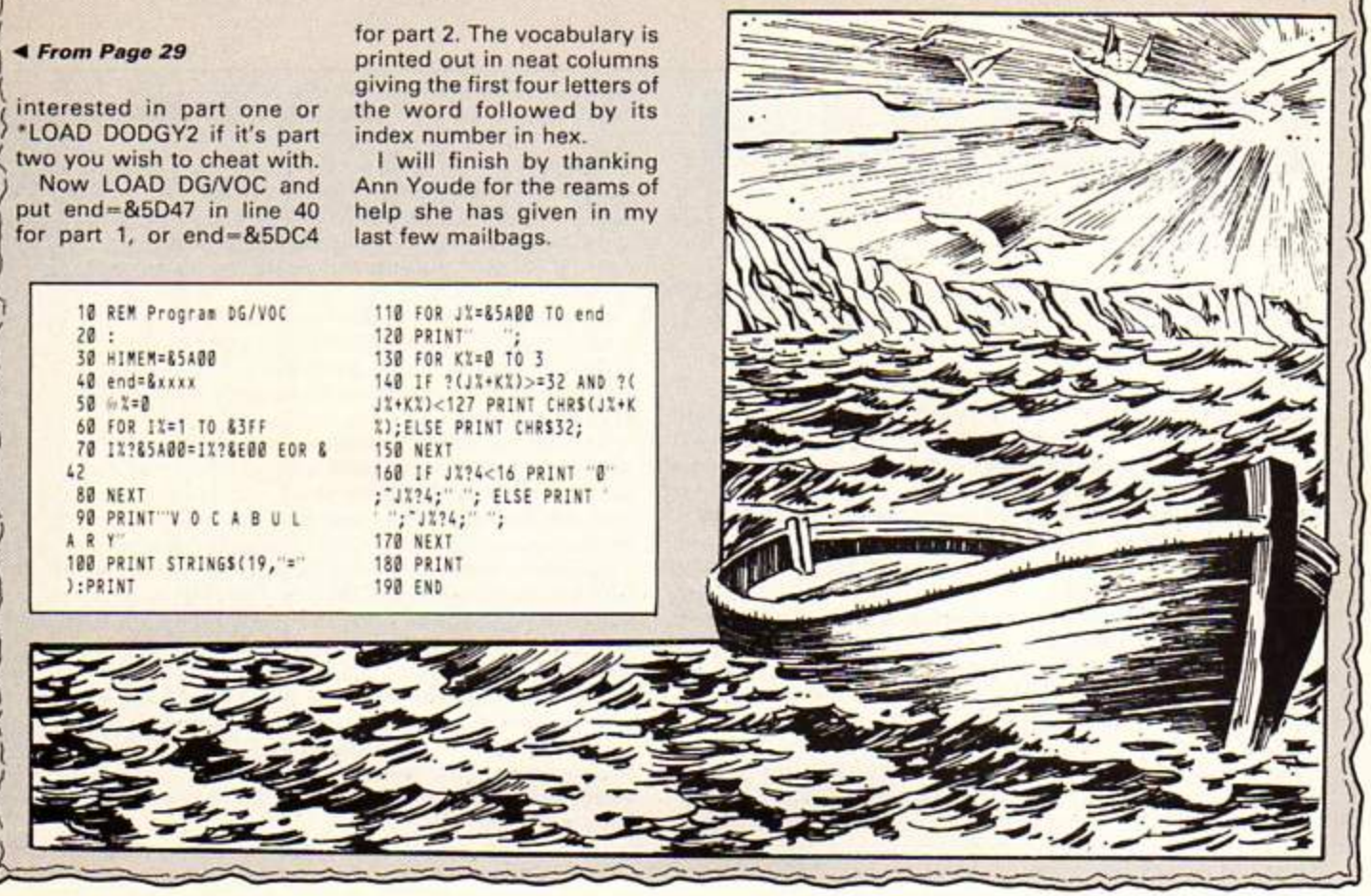
◀ From Page 29

interested in part one or *LOAD DODGY2 if it's part two you wish to cheat with.

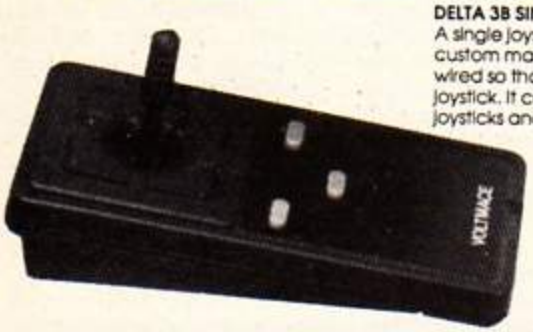
Now LOAD DG/VOC and put end=&5D47 in line 40 for part 1, or end=&5DC4 for part 2. The vocabulary is printed out in neat columns giving the first four letters of the word followed by its index number in hex.

I will finish by thanking Ann Youde for the reams of help she has given in my last few mailbags.

```
 10 REM Program DG/VOC
 20 :
 30 HIMEM=&5A00
 40 end=&xxxx
 50 @%=0
 60 FOR I%=1 TO &3FF
 70 I%?&5A00=I%?&E00 EOR &
42
 80 NEXT
 90 PRINT"V O C A B U L
A R Y"
100 PRINT STRING$(19,"=")
:PRINT
110 FOR J%=&5A00 TO end
120 PRINT"  ";
130 FOR K%=0 TO 3
140 IF ?(J%+K%)>=32 AND ?(
J%+K%)<127 PRINT CHR$(J%+K
%);ELSE PRINT CHR$32;
150 NEXT
160 IF J%?4<16 PRINT "0"
;~J%?4;" "; ELSE PRINT "
 ";~J%?4;" ";
170 NEXT
180 PRINT
190 END
```



JOYSTICKS—THE COMPLETE SOLUTION



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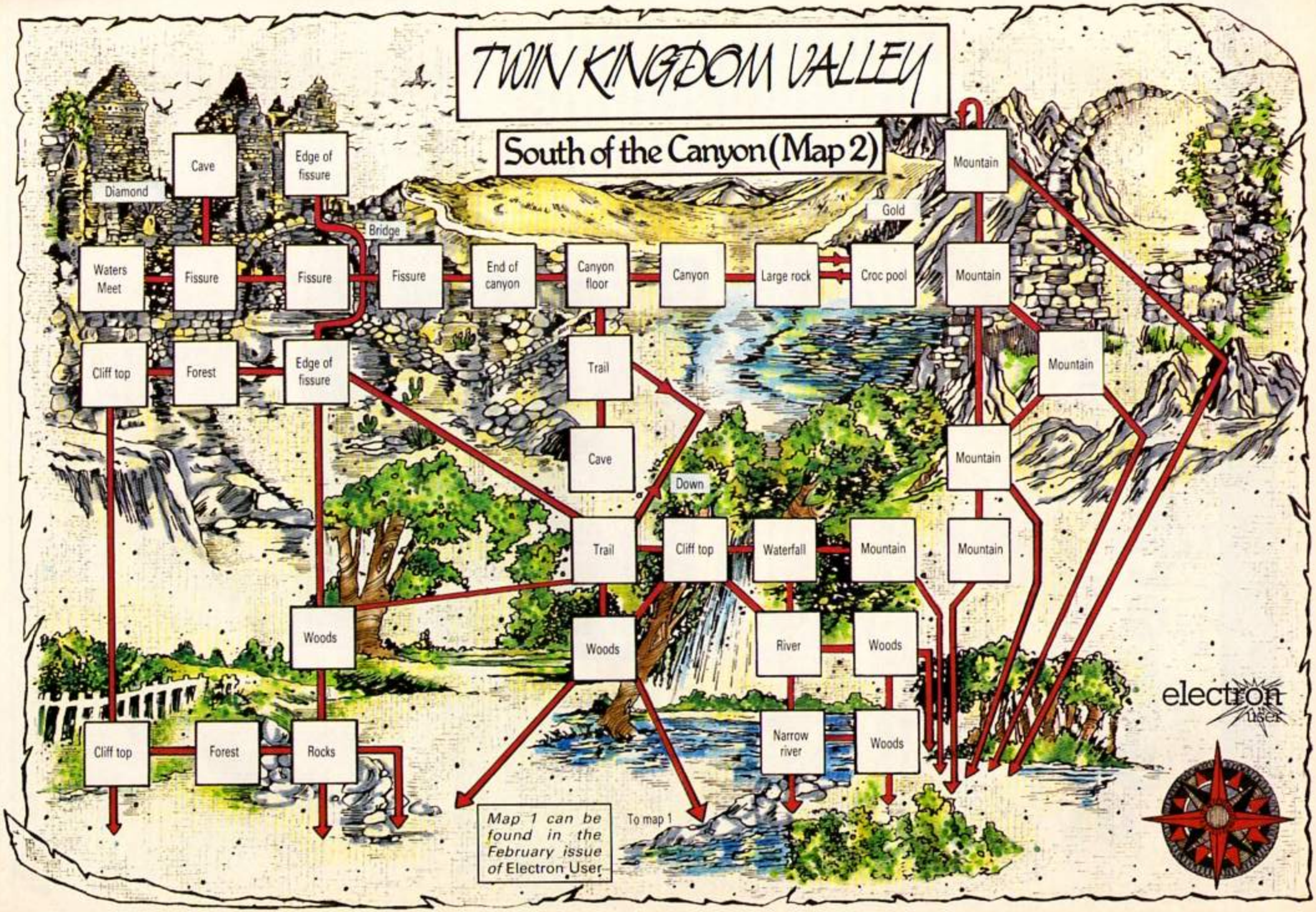

TWIN KINGDOM VALLEY
South of the Canyon (Map 2)
Cave
Edge of fissure
Diamond
Bridge
Gold
Mountain
Waters Meet
Fissure
Fissure
Fissure
End of canyon
Canyon floor
Canyon
Large rock
Croc pool
Mountain
Cliff top
Forest
Edge of fissure
Trail
Mountain
Cave
Mountain
Down
Trail
Cliff top
Waterfall
Mountain
Mountain
Woods
Woods
River
Woods
Cliff top
Forest
Rocks
Narrow river
Woods
Map 1 can be found in the February issue of Electron User
To map 1
electron user

Slithering snakes

Find the lost word in this addictive educational game

by JASON BRASIER

HISS is an exciting educational arcade game intended for young children, but it also provides hours of addictive fun for older children and adults.

Splodd the snake is enjoying a quiet slither in the garden one morning when some noisy children drop their alphabet bricks over his hedge on to the lawn.

Being very litter conscious, Splodd quickly begins to tidy the bricks away into a corner of his garden, when he realises that together they make up the letters of a word. But what is the word?

Quickly he scurries from brick to brick, looking for the next in order, but being a very greedy snake he keeps getting side-tracked into gobbling up the odd tasty worm which pokes its head up to see what all the fuss is about.

Will Splodd be able to piece all the bricks together before he crashes into the garden wall, or will he trip over his own tail in his excitement?

Find out by typing in Hiss, and give yourself and your younger friends a hugely entertaining time.

When the game starts, you are shown a word at the top of the screen which flashes for a few seconds before disappearing. This is the word you must make up from the jumble of letters which appears on the grass below.

You must guide Splodd around the garden, moving over each letter in the right order to make up the word, which must be remembered correctly to complete the screen.

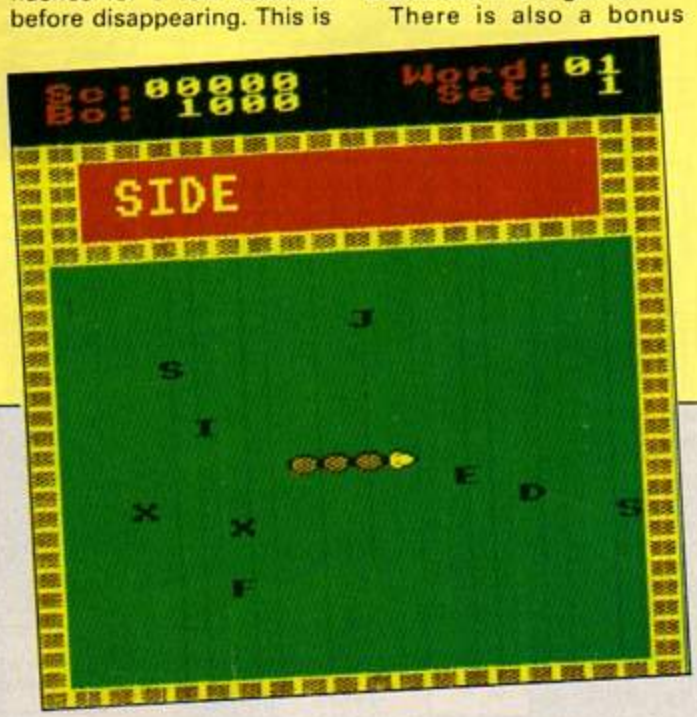
Each time Splodd slithers over the correct letter, your score will increase. For each wrong letter, no points will be awarded, and the letter will vanish to re-appear elsewhere in the garden.

There is also a bonus which starts at 1250 before every game. As you move around the garden collecting letters, this slowly counts down to zero. But if you are fast some bonus points will be left after each word has been collected and they will then be added to your score.

Occasionally, a worm will pop its head up, giving you the chance to add extra bonus points to your score. Mind you, waste too much time waiting for them to appear and any bonus you have gained so far will soon dwindle to nothing.

There are two things to look out for during your frenzied scurrying – the brick wall which surrounds the garden, and your own tail.

Crashing into either will unceremoniously lose you the game, and each worm you eat makes your tail grow longer, as does




```
  10 REM HISS
  20 REM By Jason Brasier
  30 REM (c) Electron User
  40 REM
  50 IF PAGE>&E00 PROCdload
  60 PROCinit
  70 ONERRORGOTO3640
  80 MODE6:PROCinstruct
  90 REPEAT
 100 MODE4:PROCtable
 110 MODE5:PROCgame
 120 MODE4:PROChi
 130 UNTIL0
 140 END
 150 DEFPROCgame
 160 CLS:VDU23,1,0;0;0;0;19
,3,2;0;
 170 *FX21
 180 COLOUR2:PROCdouble(2,1
3,"Speed (1 to 5) ?"):REPEAT
:SP%=GET-48:UNTILSP%>0ANDSP%
<6:SP%=(5-SP%)*15
 190 PROCgame_init:PROCdisp
lay:PROCdraw_snake
 200 PROCchoose
 210 SOUND&11,4,20,10
 220 *FX11,1
 230 FX21:Z%=GET:FX138,0
,+STR$Z%
 240 *FX11
 250 REPEAT
 260 PROCsnake
 270 IFBO%>0 BO%=BO%-10:PRO
Cbonus
 280 IFRND(50)=32THENPROCne
w_worm
 290 UNTIL DE% OR NE%
 300 IF DE% PROCdead:ENDPRO
C
 310 SOUND&11,0,0,1:FORI%=1
TO3:SOUND1,4,150,5:NEXT
 320 IFBO%=0THEN350
 330 PROCdelay(200)
 340 REPEAT:SC%=SC%+10:BO%=
BO%-10:PROCscore:PROCbonus:S
OUND&11,1,1,1:UNTILBO%=0
 350 PROCclear
 360 WO%=WO%+1:IFWO%=21THEN
WO%=1:LE%=LE%+1:IFLE%=5THENL
E%=0
 370 COLOUR128:COLOUR2:PRIN
TTAB(17,1);FNnum(WO%,2);TAB(
18,2);FNnum(LE%+1,1);
 380 IF(T%-1)<>H%THENT%=T%-
1:IFT%<0THENT%=80
 390 GOTO200
 400 ENDPROC
 410 DEFPROCsnake
 420 PROCdelay(SP%):PROCkey
s
 430 COLOUR131:PRINTTAB(X%?
T%,Y%?T%);" ";:T%=T%+1:IFT%>
80THENT%=0
 440 PROCcheck
 450 PROCprint(X%?H%,Y%?H%,
body%)
 460 H%=H%+1:IFH%>80THENH%=
0
 470 X%?H%=SX%:Y%?H%=SY%
 480 PROCprint(SX%,SY%,head
%(M%))
 490 ENDPROC
 500 DEFPROCkeys
 510 A$=INKEY$(1):*FX21
 520 IFA$=L$THENXD%=-1:YD%=
0:M%=3
 530 IFA$=R$THENXD%=1:YD%=0
:M%=1
 540 IFA$=U$THENXD%=0:YD%=-
1:M%=0
 550 IFA$=D$THENXD%=0:YD%=1
:M%=2
 560 IFA$="S"THEN*FX210
 570 IFA$="Q"THEN*FX210,1
 580 IFA$=CHR$127THENPROCpa
use:GOTO510
 590 ENDPROC
 600 DEFPROCcheck
 610 SX%=SX%+XD%:SY%=SY%+YD
%
 620 COLOUR131:Z%=FNread(SX
%,SY%)
 630 IFZ%>64ANDZ%<91THENPRO
```

completing a word successfully.

Therefore your task becomes gradually more difficult as you haul behind you an ever-growing length of body.

As the game progresses, the words to collect become gradually more and more difficult to spell.

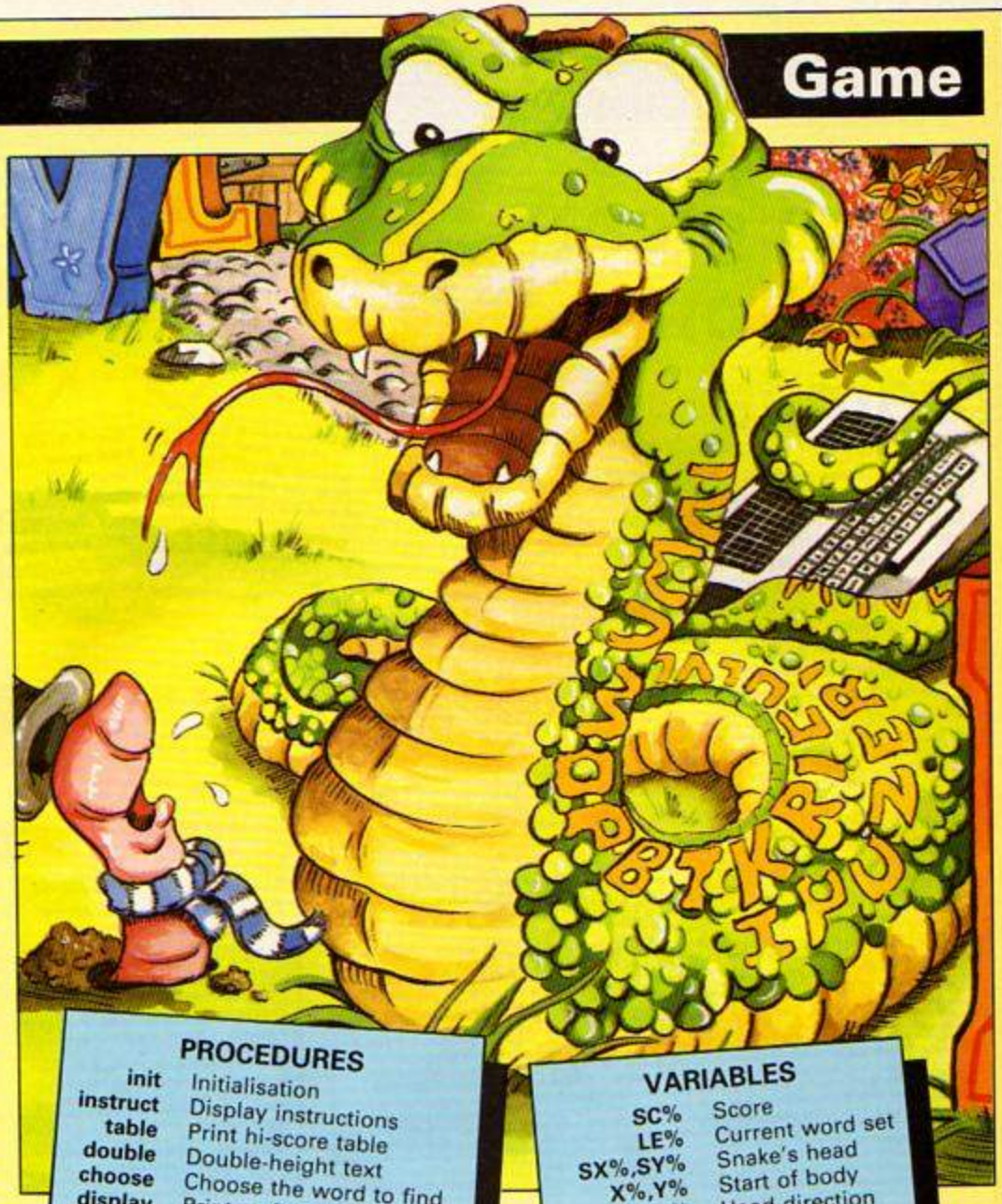
There are five different sets of words built in to the game, each set comprising several words of a certain length, which is proportional to the difficulty of that level.

However, all words can be changed to a selection of your choice before each game by pressing O to display the options menu. This allows you to change any word and then save the altered word lists, or you can load in a previously saved selection.

To make things easier Splodd's speed can be altered to one of five settings at the start of each game.

The slowest is ideal for younger children, letting Splodd creep along at a relaxing pace.

The fastest speed, however, is far from relaxing – even the hardened arcade fan will be more than satisfied by its performance.



PROCEDURES

init	Initialisation
instruct	Display instructions
table	Print hi-score table
double	Double-height text
choose	Choose the word to find
display	Print main screen display
letter	Pick up a letter

VARIABLES

SC%	Score
LE%	Current word set
SX%,SY%	Snake's head
X%,Y%	Start of body
M%	Head direction
WX%,WY%	Worm's position

```
Cletter:ENDPROC
  640 IFZ%=32THENENDPROC
  650 IFSX%=WX%ANDSY%=WY%THE
NPROCeat:ENDPROC
  660 DE%=TRUE
  670 ENDPROC
  680 DEFPROCletter
  690 A$=CHR$Z%
  700 IFA$<>MID$(W$,PO%,1)TH
ENPROCwrong:ENDPROC
  710 SOUND&11,1,1,10:SC%=SC
%+20:PROCscore
  720 COLOUR129:COLOUR2:PROC
double(2+PO%,6,A$):PO%=PO%+1
  730 IFPO%>LENW$THENNE%=TRU
E
  740 ENDPROC
  750 DEFPROCwrong
  760 SOUND&11,2,20,4
  770 IFSC%>9THENSC%=SC%-10:
PROCscore
  780 PROCplace(A$)
  790 ENDPROC
  800 DEFPROCclear
  810 COLOUR131:FORJ%=10TO30
:FORI%=1TO18
  820 Z%=FNread(I%,J%):IFZ%>
64ANDZ%<91THENPRINTTAB(I%,J%
);" ";
  830 NEXT:NEXT:ENDPROC
  840 DEFPROCdead
  850 SOUND&11,3,200,40
  860 DATA G,a,m,e," ",O,v,e
,r,!
  870 COLOUR128:COLOUR2
  880 PROCdelay(400):RESTORE
860
  890 FORI%=0TO9:READA$:PROC
double(I%+5,19,A$):SOUND&11,
-15,10+20*I%,2:PROCdelay(50)
:NEXT
  900 PROCdelay(100):ENDPROC
  910 DEFPROCnew_worm
  920 COLOUR131
  930 IFWX%>0THENPRINTTAB(WX
%,WY%);" ";
  940 REPEAT:I%=RND(18):J%=R
ND(21)+9:UNTILFNread(I%,J%)=
32
  950 WX%=I%:WY%=J%
  960 PROCprint(I%,J%,worm%)
  970 ENDPROC
  980 DEFPROCeat
  990 SOUND&11,4,100,3
 1000 SC%=SC%+100:PROCscore
 1010 IF(T%-1)<>H%THENT%=T%-
1:IFT%<0THENT%=80
 1020 WX%=0:ENDPROC
 1030 DEFPROCpause
 1040 *FX21":REPEAT:A$=GET$
 1050 IFA$="S"THEN*FX210
 1060 IFA$="Q"THEN*FX210,1
 1070 UNTILA$=CHR$135
 1080 PROCdelay(50)
 1090 ENDPROC
 1100 DEFPROCgame_init
 1110 SC%=0:LE%=0:BO%=0:WO%=
1:DE%=FALSE:WX%=0:WY%=0
 1120 ENDPROC
 1130 DEFPROCdisplay
 1140 CLS
 1150 COLOUR1:PRINTTAB(1,1);
"Sc:";TAB(1,2);"Bo:";TAB(12,
1);"Word:";TAB(13,2);"Set:"
 1160 FORI%=0TO19:PROCprint(
I%,4,wall%):PROCprint(I%,9,w
all%):PROCprint(I%,31,wall%)
:NEXT
 1170 FORI%=5TO30:PROCprint(
0,I%,wall%):PROCprint(19,I%,
wall%):IFI%<9THENPROCprint(1
,I%,wall%):PROCprint(18,I%,w
all%):NEXTELSENEXT
 1180 VDU28,2,8,17,5,17,129,
12,17,128,26
 1190 PROCcls:PROCscore:PROC
bonus
 1200 PRINTTAB(17,1);"01";TA
B(18,2);"1";
 1210 ENDPROC
 1220 DEFPROCdraw_snake
 1230 T%=0:H%=3:M%=1
 1240 FORI%=0TO2:X%?I%=I%+8:
Y%?I%=20:PROCprint(I%+8,20,b
ody%):NEXT
 1250 X%?H%=11:Y%?H%=20
 1260 XD%=1:YD%=0:SX%=11:SY%
=20
 1270 PROCprint(9,20,body%)
 1280 PROCprint(11,20,head%(
M%))
 1290 ENDPROC
 1300 DEFPROCchoose
 1310 SOUND&11,1,100,12:PROC
delay(60)
```

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More great Electron games

This month we introduce a new volume in our Ten of the Best series – 10 more games to give you many hours of fun and entertainment.

These four packages are crammed with the best games from the last two years of Electron User. As an added bonus a previously unpublished game has been added to each one – stunning machine code masterpieces from our technical wizard, Roland Waddilove.

So give yourself a treat. . . with the most popular games compilations we've ever produced.

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Volume 1

Jam Butty: *Machine code simulation of high drama on a building site.*
Golf: *Play a round by yourself, or play against your pals*
Haunted House: *Fight against all the odds to get out alive.*
Space Hike: *Another classic, Help the spaceman avoid marauding monsters.*
Parky's Peril: *Help Parky through an invisible maze, racing against time.*
Rally Driver: *All the thrills of high-speed driving with none of the risks.*
Alphaswap: *Your letters are in a twist. Can you put them in order.*
Knockout: *Fast and furious action as you batter down a brick wall.*
Money Maze: *Avoid ghosts and collect coins in an all-action arcade classic.*
Lunar Lander: *The traditional computer game specially written for the Electron.*

Volume 2

Atom Smash: *Machine code thrills as you help to save the world from destruction.*
Bunny Blitz: *Go egg collecting, but keep away from proliferating rabbits.*
Castles of Sand: *Build castles – but beware the rising tide and hungry sandworms.*
Reaction Timer: *Test your reactions with this traffic lights simulation.*
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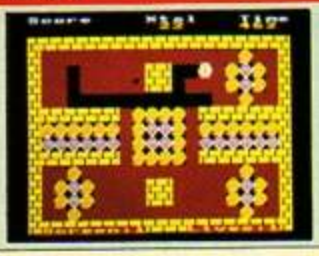
Jumper: *Jump for your life in this exciting arcade action game.*
Break free: *Test your wits and reflexes in this popular classic ball game.*
Code breaker: *Crack the code in a colourful if frustrating brainteaser.*
Parachute: *Save the plunging sky divers from a watery end.*
Star fighter: *Attack the bandit ships in this fast-moving 3D punch up.*

Volume 3



Rockfall: *Come diamond mining in this fun packed game with its own screen designer.*
Karate Warrior: *Win your black belt in this gruelling test of karate skill.*
Grand Prix: *Battle your way into the lead in this tricky racing simulation.*
Invasion Force: *Can you survive wave after wave of relentlessly advancing aliens.*
Grebit: *Guide the frog across the busy road then across the fast-flowing river!*
Fruit Worm: *Steer the worm towards the fruit while avoiding rocks and its ever-growing tail.*
Manic Mole: *Watch out for melting platforms and conveyor belts in your quest for jewels.*
Skramble: *Fly your fighter fast and low over the landscape to penetrate enemy territory.*
Mr. Freeze: *You'll need speed and strategy to reach the ice blocks before they melt away.*
Paint Roller: *Steer a speeding roller, run over paint pots but keep clear of the rocks.*

Volume 4

NEW

Lunar Invasion: *Defend the moon from wave after wave of marauding aliens in this superb multi-screen arcade game.*
Howzat: *Try not to get caught out in this vivid recreation of a day's test cricket.*
Snapdragon: *Enjoy this two-player micro version of the familiar card game.*
Day at the Races: *Fancy a flutter? You can bet your shirt in safety in this two-player horse racing game.*
Reversi: *Combine cunning and chance as you try to out-think your Electron at this classic board game.*
Fishing: *Relax and enjoy a quiet afternoon by a shady brook. You'll regret if you let this one get away.*
Cavern Capers: *Escape from the depths of the planet by blasting oil drums and dodging deadly fireballs.*
Craal: *Escape from the maxe and win the beautiful princess in this superb text adventure.*
Oxo: *High strategy meets low cunning in a logic game to strain your brain.*
Missile Attack *Defend your city from a missile invasion and save it from certain doom.*

TO ORDER PLEASE USE THE FORM ON PAGE 53

Hiss listing

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```
 1320 VDU28,2,8,17,5,17,129,
12,26
 1330 W$=W$(LE%,RND(15)-1)
 1340 BO%=250*LENW$:PROCbonu
s
 1350 FORI%=1TOLENW$
 1360 PROCplace(MID$(W$,I%,1
))
 1370 NEXT
 1380 FORI%=1TO5:PROCplace(C
HR$(RND(26)+64)):NEXT
 1390 COLOUR129:COLOUR2:FORI
%=1TO5
 1400 PROCdouble(3,6,W$):PRO
Cdelay(50)
 1410 PROCdouble(3,6,STRING$
(14," "):PROCdelay(50)
 1420 NEXT
 1430 NE%=FALSE:PO%=1
 1440 ENDPROC
 1450 DEFPROCprint(x%,y%,c%)
:A%=&5800+x%*16+y%*320:?&72=
A%MOD256:?&73=A%DIV256:?&70=
c%MOD256:?&71=c%DIV256:CALLC
%:ENDPROC
 1460 DEFFNread(x%,y%):PRINT
TAB(x%,y%);:CALLR%:=?&74
 1470 DEFPROCdouble(x%,y%,t$
):PRINTTAB(x%,y%);:$str%=t$:
CALLD%:ENDPROC
 1480 DEFFNnum(x%,y%)=RIGHT$
("0000000"+STR$x%,y%)
 1490 DEFPROCcls:VDU28,1,30,
18,10,17,131,12,17,128,26:EN
DPROC
 1500 DEFPROCscore:COLOUR128
:COLOUR2:PRINTTAB(4,1);FNnum
(SC%,5);:ENDPROC
 1510 DEFPROCbonus:COLOUR128
:COLOUR2:PRINTTAB(5,2);FNnum
(BO%,4);:ENDPROC
 1520 DEFPROCplace(t$)
 1530 COLOUR131:COLOUR0:REPE
AT:J%=RND(18):K%=RND(21)+9:U
NTILFNread(J%,K%)=32AND(J%<>
X%?T%ANDK%<>Y%?T%):PRINTTAB(
J%,K%);t$;
 1540 ENDPROC
 1550 DEFPROCdelay(x%):TIME=
0:REPEATUNTILTIME>x%:ENDPROC
 1560 DEFPROCtable
 1570 VDU23,1,0;0;0;0;19,1,3
;0;
 1580 PROCdouble(13,0,"Hiss
Hi-Scores")
 1590 FORI%=0TO5:PROCdouble(
0,5+3*I%,STR$(I%+1)+" "+FNnu
m(H%(I%),8)+" "+H$(I%)):NEXT
 1600 PROCdouble(6,24,"Your
last score was "+FNnum(SC%,8
))
 1610 PROCdouble(2,29,"Press
 SPACE to play or O for opti
ons")
 1620 *FX21:REPEAT:Z%=INSTR
(" Oo",GET$):UNTILZ%>0
 1630 IFZ%<2THENENDPROC ELSE
PROCopts
 1640 CLS:GOTO1570
 1650 ENDPROC
 1660 DEFPROCopts
 1670 CLS
 1680 PROCdouble(13,10,"Opti
ons Menu")
 1690 PROCdouble(13,14,"1. C
hange words")
 1700 PROCdouble(13,17,"2. R
edefine keys")
 1710 REPEAT:Z%=GET-48:UNTIL
Z%>0ANDZ%<3
 1720 IFZ%=1THENPROCwords:EN
DPROC
 1730 PROCred_keys:ENDPROC
 1740 DEFPROCred_keys
 1750 CLS:VDU19,1,5;0;
 1760 PROCdouble(11,7,"Left:
"):L$=FNkey(7)
 1770 PROCdouble(11,10,"Righ
t:"):R$=FNkey(10)
 1780 PROCdouble(11,13,"Up:
"):U$=FNkey(13)
 1790 PROCdouble(11,16,"Down
:"):D$=FNkey(16)
 1800 PROCdelay(100)
 1810 ENDPROC
 1820 DEFFNkey(y%):REPEAT:A$
=GET$:UNTILINSTR("SQ"+CHR$12
7+CHR$135+CHR$13,A$)=0:PROCd
ouble(28,y%,A$):=A$
 1830 DEFPROChi
 1840 VDU23,1,0;0;0;0;19,1,1
;0;
 1850 I%=-1:REPEAT:I%=I%+1:U
NTILSC%>H%(I%)ORI%=5
 1860 IFI%=5ANDSC%<=H%(5)THE
NENDPROC
 1870 PROCdouble(12,6,"CONGR
ATULATIONS")
 1880 IFI%=5THEN1900
 1890 FORJ%=4TOI%STEP-1:H%(J
%+1)=H%(J%):H$(J%+1)=H$(J%):
NEXT
 1900 IFI%=0THENA$="1st"
 1910 IFI%=1THENA$="2nd"
 1920 IFI%=2THENA$="3rd"
 1930 IFI%>2THENA$=STR$(I%+1
)+"th"
 1940 PROCdouble(14,10,"You
are "+A$)
 1950 PROCdouble(8,14,"Pleas
e enter your name:")
 1960 *FX12
 1970 H$(I%)=FNinput(5,18,29
,32,126)
 1980 H%(I%)=SC%
 1990 ENDPROC
 2000 DEFFNinput(x%,y%,mi%,m
i%,ma%)
 2010 A$="":REPEAT:*FX21
 2020 KE%=GET
 2030 IFKE%=127ANDA$<>""THEN
A$=LEFT$(A$,LENA$-1):PROCdou
ble(x%-1,y%," "):x%=x%-1:GOT
O2020
 2040 IFKE%=13THEN2080
 2050 IFKE%<mi%ORKE%>ma%ORLE
NA$=mi%THEN2020
 2060 A$=A$+CHR$KE%:x%=x%+1
 2070 PROCdouble(x%-1,y%,CHR
$KE%)
 2080 UNTILKE%=13
 2090 =A$
 2100 DEFPROCwords
 2110 CLS:VDU19,1,2;0;
 2120 PRINTTAB(11,9);"Change
 words Menu"
 2130 PRINT
 2140 PRINTSPC(11);"1. List
word set 1"
 2150 PRINTSPC(11);"2. List
word set 2"
 2160 PRINTSPC(11);"3. List
word set 3"
 2170 PRINTSPC(11);"4. List
word set 4"
 2180 PRINTSPC(11);"5. List
word set 5"
 2190 PRINTSPC(11);"6. Save
the words"
 2200 PRINTSPC(11);"7. Load
new words"
 2210 PRINTSPC(11);"8. Exit"

 2220 PRINTSPC(11);"Select y
our option"
 2230 *FX21:*FX12
 2240 REPEAT:Z%=GET-48:UNTIL
Z%>0ANDZ%<9
 2250 IFZ%=8THENENDPROC
 2260 IFZ%=7THENPROCload:GOT
O2110
 2270 IFZ%=6THENPROCsave:GOT
O2110
 2280 CLS:PRINTTAB(0,5);"Wor
d Set ";Z%;
 2290 Z%=Z%-1
 2300 FORI%=0TO14:PRINTTAB(0
,7+I%);FNnum(I%+1,2);" ";W$(
I%,I%);:NEXT
 2310 VDU28,20,31,39,0,12
 2320 PRINTTAB(0,7);"C. Chan
ge"
 2330 PRINTTAB(0,8);"E. Exit

 2340 PRINTTAB(0,10);"Please
 select"
 2350 REPEAT:K%=INSTR("CcEe"
,GET$):UNTILK%>0
 2360 IFK%>2THENVDU26:GOTO21
10
 2370 PRINTTAB(0,13);"Which
word?"
 2380 K%=VAL(FNinput(0,15,2,
48,57))
 2390 IFK%=0ORK%>15THENPROCd
ouble(0,15," "):GOTO2380
 2400 K%=K%-1
 2410 PRINTTAB(0,18);"Enter
word:";
 2420 W$(Z%,K%)=FNinput(0,20
,14,65,90)
 2430 IFW$(Z%,K%)=""THEN2420
 2440 VDU26:PRINTTAB(3,7+K%)
;SPC(14);TAB(3,7+K%);W$(Z%,K
%);
 2450 GOTO2310
 2460 ENDPROC
 2470 DEFPROCsave
 2480 CLS:PROCdouble(0,13,"S
AVE: Please enter filename:"
):A$=FNinput(29,13,10,33,126
)
 2490 IFA$=""THENENDPROC
 2500 PRINT""
 2510 I%=OPENOUT(A$)
 2520 FORI%=0TO4:FORJ%=0TO14
 2530 PRINT#I%,W$(I%,J%)
 2540 NEXT:NEXT
 2550 CLOSE#I%
 2560 ENDPROC
 2570 DEFPROCload
 2580 CLS:PROCdouble(0,13,"L
OAD: Please enter filename:"
):A$=FNinput(29,13,10,33,126
)
 2590 IFA$=""THENENDPROC
 2600 I%=(A$)
 2610 FORI%=0TO4:FORJ%=0TO14
 2620 INPUT#I%,W$(I%,J%)
 2630 NEXT:NEXT
 2640 CLOSE#I%
 2650 ENDPROC
 2660 DEFPROCinstruct
 2670 VDU23,1,0;0;0;0;19,1,6
;0;
 2680 PRINTTAB(10,12);"Instr
uctions (Y/N) ?":REPEAT:Z%=I
NSTR("YyNn",GET$):UNTILZ%>0:
IFZ%>2 THENENDPROC
 2690 CLS
 2700 PRINTTAB(18,0);"Hiss";
TAB(18,1);"-----"
 2710 PRINT"    The object o
f the game is to guide asnak
e to pick up letters to spel
l       certain words. The c
omputer will show   which wo
rd to spell at the beginning
 of the game."
 2720 PRINT"    You must sim
ply guide your snake    over
 the correct letters in the
same    order as the spelt w
ord."
 2730 PRINT"    When you com
plete a word, you go    onto
 the next, and so on. The ga
me will get harder as your s
nake grows!"
 2740 PRINT"    You will die
 if you either run into your
 own tail or run into the wa
ll      around the outside.
You will only get   the one
life!"
 2750 PRINT"    A bonus of 1
00 points is available  when
 you eat the worms that pop
up from beneath the ground!"
 2760 *FX21:PRINTTAB(7,23);
"Press SPACE to continue..."
;:REPEATUNTILGET=32:CLS
 2770 PRINTTAB(18,0);"Hiss";
TAB(18,1);"-----"
 2780 PRINTSPC(7);"Here are
your controls:-"
 2790 PRINTSPC(7);L$;" .....
 Move snake left"
 2800 PRINTSPC(7);R$;" .....
 Move snake right"
 2810 PRINTSPC(7);U$;" .....
 Move snake up"
 2820 PRINTSPC(7);D$;" .....
 Move snake down"
 2830 PRINTSPC(7);"Extra key
s are:-"
 2840 PRINTSPC(7);"S ..... T
urn sound on"
 2850 PRINTSPC(7);"Q ..... T
urn sound off"
 2860 PRINTSPC(7);"DEL ... P
ause"
 2870 PRINTSPC(7);"COPY .. R
estart paused game"
 2880 PRINTSPC(7);"ESC ... I
nstructions"
 2890 PRINTSPC(7);"(Ensure C
APS LOCK is ON)"
 2900 PRINTTAB(7,23);"Press
SPACE to continue...";:*FX21
:REPEATUNTILGET=32
 2910 ENDPROC
 2920 DEFPROCinit
 2930 Q%=RND(-TIME)
 2940 DIMQ%238,str%21,X%80,Y
%80,W$(4,14),H%(5),H$(5),hea
d%(3)
 2950 FORI%=0TO5:H%(I%)=6000
-1000*I%:H$(I%)="****** Jaso
n Brasier "+STR$(I%+1)+" ***
***":NEXT
 2960 PROCass:PROCdata
 2970 L$="Z":R$="X":U$=":":D
$="/":SC%=0
 2980 ENVELOPE1,1,3,2,1,10,1
0,10,126,0,0,-126,126,126
 2990 ENVELOPE2,2,-1,0,0,10,
0,0,126,0,0,-126,126,126
```

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Hiss listing

◀ From Page 35

```
 3000 ENVELOPE3,2,-1,0,0,100
,0,0,126,0,0,-126,126,126
 3010 ENVELOPE4,1,3,0,0,100,
0,0,126,0,0,-126,126,126
 3020 VDU23,136,16,48,112,25
5,255,112,48,16
 3030 VDU23,137,8,12,14,255,
255,14,12,8
 3040 VDU23,138,24,24,24,24,
255,126,60,24
 3050 VDU23,139,24,60,126,25
5,24,24,24,24
 3060 *FX4,1
 3070 ENDPROC
 3080 DEFPROCass
 3090 FOR I%=0TO2STEP2
 3100 P%=Q%:[OPTI%
 3110 .R%
 3120 LDA#135:JSR&FFF4:STX&7
4:RTS
 3130 .C%
 3140 LDY#15:.loop
 3150 LDA(&70),Y:STA(&72),Y
 3160 DEY:BPLloop
 3170 RTS
 3180 .head%(0)
 3190 EQUD&B8B8DCEE:EQUD&CCB
87052:EQUD&D1D1B377:EQUD&33D
1E0A4
 3200 .head%(1)
 3210 EQUD&7061B8CC:EQUD&CCB
86170:EQUD&E0D133FF:EQUD&FF3
3D1E0
 3220 .head%(2)
 3230 EQUD&5270B8CC:EQUD&EED
CB8B8:EQUD&A4E0D133:EQUD&77B
3D1D1
 3240 .head%(3)
 3250 EQUD&70B8CCFF:EQUD&FFC
CB870:EQUD&E068D133:EQUD&33D
168E0
 3260 .body%
 3270 EQUD&2757ABCC:EQUD&CC9
B2757:EQUD&AE4E9D33:EQUD&335
DAE4E
 3280 .wall%
 3290 EQUD&A7D7A7F0:EQUD&F0D
7A7D7:EQUD&BE5EBEF0:EQUD&F05
EBE5E
 3300 .worm%
 3310 EQUD&D8F8F9FC:EQUD&EEC
CEEFC:EQUD&F3F3F7FF:EQUD&11C
0D1F3
 3320 .D%
 3330 LDX#0:.loop1
 3340 LDAstr%,X:CMP#13:BEQen
d
 3350 JSRdouble
 3360 INX:JMPloop1
 3370 .end RTS
 3380 .double
 3390 STA&80:STX&7F:LDA#10:L
DX#&80:LDY#0:JSR&FFF1
 3400 LDA#23:JSR&FFEE:LDA#22
4:JSR&FFEE
 3410 LDY#0:.loop2
 3420 LDA&81,Y:JSR&FFEE:JSR&
FFEE
 3430 INY:CPY#4:BNEloop2
 3440 LDA#23:JSR&FFEE:LDA#22
5:JSR&FFEE
 3450 .loop3
 3460 LDA&81,Y:JSR&FFEE:JSR&
FFEE
 3470 INY:CPY#8:BNEloop3
 3480 LDX&7F:LDA#224:JSR&FFE
E:LDA#10:JSR&FFEE:LDA#8:JSR&
FFEE:LDA#225:JSR&FFEE:LDA#11
:JMP&FFEE
 3490 ]:NEXT
 3500 ENDPROC
 3510 DEFPROCdata
 3520 RESTORE3550
 3530 FOR I%=0TO4:FOR J%=0TO14
:READW$(I%,J%):NEXT:NEXT
 3540 ENDPROC
 3550 DATA HELLO,WHERE,SNAKE
,SHAPE,ANGLE,DRINK,RIVER,STR
EAM,RULER,PENCIL,WINDOW,YELL
OW,BLOW,BEHIND,SIDE
 3560 DATA FARMYARD,BEYOND,B
EWARE,RAINBOW,MAGNET,FRUIT,B
ANANA,FOREVER,SNOWMAN,CREAM,
DRIVER,MOTOR,BIRTHDAY,STRONG
,TIRED
 3570 DATA QUESTION,ANSWER,M
INUTE,CONVINCE,SENIOR,JUNIOR
,ROMANTIC,COMBUSTION,INITAIL
IZE,PROCEDURE,NEUTRALIZE,EAR
THQUAKE,DICTIONARY,CALCULATO
R,AFTERNOON
 3580 DATA CONSIDERATE,ELECT
RICITY,UNIDENTIFIED,ELECTRON
ICS,MODERATE,TEMPERATURE,TEC
HNOLOGY,MICROSCOPE,OPERATION
,PROGRAMME,XYLOPHONE,TELEVIS
ION,RECOGNISE,TRANSMISSION,O
CCUPATION
 3590 DATA INTERNATIONAL,ENC
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 3600 DEFPROCdload
 3610 *K.0"*T.:MD%=PAGE-&E00
:FOR I%=PAGE TO TOP STEP4:!(I
%-D%)=!I%:NEXT:MPAGE=&E00:MO
LD:MRUN:F:M"
 3620 VDU21:*FX138,0,128
 3630 END
 3640 REM * DON'T enter foll
owing line until the program
 works properly *
 3650 IFERR=17THEN80
 3660 IFERR>215ANDERR<220THE
NPROCdata:GOTO90
 3670 MODE6:VDU7:PRINT":REP
ORT:PRINT" at line ";ERL
 3680 END
```

This listing is included in this month's cassette tape offer. See order form on Page 53.

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Creating the right image

In Part 2 of his series ROBIN NIXON continues his exploration into creating new character sets for your printer

LAST month we examined ways of exploding user-defined character definitions (a term used for expanding the memory allocated to the character set).

Now we will look at how to print these characters on an Epson compatible printer.

You should by now have created your own character set using last month's editor. But don't worry if you haven't, because the techniques we'll be using work equally well with the Electron's own built-in character set.

The way you get an Epson to print out any character definition is called bit imaging. Once bit image mode has been initialised, in place of sending the Ascii value of a character to the printer, the character's definition is sent – one byte at a time.

This definition works in a similar manner to VDU 23, except that the character needs to be rotated through 90 degrees. This is because the pins on a dot matrix printer are arranged vertically, as you can see in Figure I.

You may also notice that the Epson has nine dot wires. The ninth is used for underlining and lower case descenders. As descenders and underlining are kept within the eight by eight character cell on an Electron, the ninth wire is not used in bit image mode.

Let's have a look at how we would print the letter A in bit image mode.

To define A in Basic as a user-defined character, assuming it doesn't already exist, we would enter the command:

```
VDU 23,65,56,108,108,198,25
4,198,198,0
```

The result can be seen in Figure II. So far, so good.

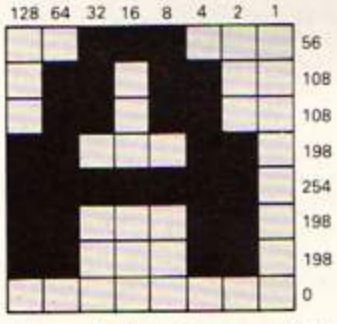

Figure II: The character definition of A held in the Electron

But as the character has to be rotated to the left by 90 degrees for the bit image definition shown in Figure III, we have to send the following sequence to the printer:

```
30,126,232,136,232,126,30,0
```

Before we send the rotated A however, we must first tell the printer to go into bit image mode by sending the escape sequence:

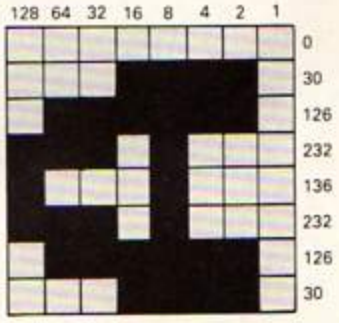

Figure III: The definition as it must be sent to an Epson printer

```
1,27,1,75
```

The 1 before the 27 and 75 tells the computer to send the next byte to the printer only. The 27 tells the printer that an escape sequence is to follow and the 75 is ASC"K" which instructs the printer to go into bit image mode.

Next we must say how many bytes of bit image information are to follow so the Epson knows when to go back to normal printing, and doesn't confuse ordinary letters with bit image data.

In the case of the letter A this is eight bytes because we are only sending the one character, which has a definition made up of eight bytes.

Because there may be more than 256 bytes of data sometimes, the format we send this number in is the low byte followed by the high byte of the number of data items.

If you look at Program I, you will see that lines 80 to 100 initialise the printer to bit image mode and prepare it for eight bytes of data.

Then line 110 sends the data for character A which is printed out when all the data has been received by the printer.

Program II, Printit, assembles a machine code

Turn to Page 38 ▶

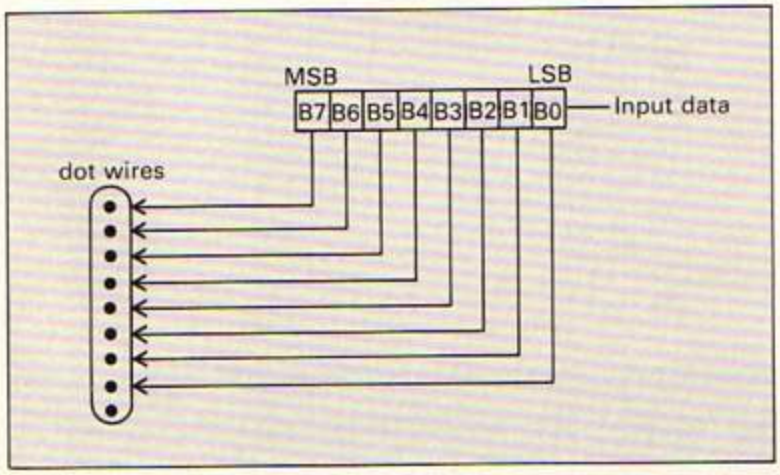

Figure I: Relationship between data and dot wires

◀ *From Page 37*

program called Driver which, when *RUN or called, intercepts the print vector oswrch at &20E and waits for a VDU 2 – printer on – ignoring anything else.

When a VDU 2 is received all following bytes are assumed to be printable characters.

The definitions of these are then looked up using osword &A, rotated and sent to the printer. This means that no matter what characters you've defined in your programs using VDU 23, they will be displayed correctly on the printer.

When run, Printit asks you for an address to assemble to. You can experiment with different locations altering HIMEM or PAGE accordingly – either lower HIMEM or raise PAGE to make room for the code.

Remember, if you press BREAK the utility will be destroyed and you'll have to reload it. Thereafter, to use Driver, always set PAGE or HIMEM to the value it was set at when you ran Printit.

Although the program runs fairly slowly, it is still faster than a screen dump, and in fact, with a little ingenuity could be used as one.

● *Next month I'll show how to create a squashed character set giving 40 characters per line in Modes 2 and 5 or 80 characters per line in Mode 1.*

```
 10 REM Program to
 20 REM print 'A'
 30 REM
 40 REM By Robin Nixon
 50 REM (c) Electron User
 60 REM
 70 VDU 2
 80 VDU 1,27
 90 VDU 1,ASC("K")
100 VDU 1,8,1,0
110 VDU 1,30,1,126,1,232
120 VDU 1,136,1,232,1,126
130 VDU 1,30,1,0
140 END
```

Program I

```
  10 REM      PRINTIT
  20 REM
  30 REM  By  Robin Nixon
  40 REM (c) Electron User
  50 REM
  60 MODE 6
  70 chartable=&80
  80 INPUT "Enter address
to assemble to (in hex)"'
"A$:A$="&"+A$:START=EVAL A
$
  90 FOR PASS=0 TO 3 STEP
3
 100 P%=START
 110 [
 120 OPT PASS
 130 \
 140 .init
 150 \
 160 LDA &20E
 170 STA &70
 180 LDA &20F
 190 STA &71
 200 LDA #start MOD &100
 210 STA &20E
 220 LDA #start DIV &100
 230 STA &20F
 240 LDA #0
 250 STA &72
 260 STA &74
 270 STA &7C
 280 STA &7F
 290 RTS
 300 \
 310 .start
STR$"START+" "+STR$"P%)
 320 \
 330 PHA
 340 LDA #1
 350 CMP &74
 360 BNE noskipflag
 370 PLA
 380 JMP (&70)
 390 \
 400 .noskipflag
 410 \
 420 PLA
 430 STA &73
 440 CMP #2
 450 BNE notprinteron
 460 PHA
 470 LDA #1
 480 STA &72
 490 PLA
 500 JMP (&70)
 510 \
 520 .notprinteron
 530 \
 540 CMP #3
 550 BNE notprinteroff
 560 PHA
 570 LDA #0
 580 STA &72
 590 PLA
 600 JMP (&70)
 610 \
 620 .notprinteroff
 630 \
 640 PHA
 650 TXA
 660 PHA
 670 TYA
 680 PHA
 690 PHP
 700 LDA &73
 710 CMP #32
 720 BCS testsendflag
 730 JMP quit
 740 \
 750 .testsendflag
 760 \
 770 PHA
 780 LDA #1
 790 CMP &72
 800 BEQ send
 810 PLA
 820 JMP quit
 830 \
 840 .send
 850 \
 860 PLA
 870 LDA #1
 880 STA &74
 890 LDA &7F
 900 CMP #1
 910 BEQ alreadyset
 920 LDA #1
 930 STA &7F
 940 JSR &FFEE
 950 LDA #27
 960 JSR &FFEE
 970 LDA #1
 980 JSR &FFEE
 990 LDA #75
1000 JSR &FFEE
1010 LDA #1
1020 JSR &FFEE
1030 LDA #224
1040 JSR &FFEE
1050 LDA #1
1060 JSR &FFEE
1070 JSR &FFEE
1080 \
1090 .alreadyset
1100 \
1110 LDX #chartable MOD &1
00
1120 LDY #chartable DIV &1
00
1130 LDA &73
1140 STA chartable
1150 LDA #&A
1160 JSR &FFF1
1170 LDA #128
1180 STA &75
1190 \
1200 .loop1
1210 \
1220 LDA #0
1230 STA &76
1240 LDA #128
1250 STA &77
1260 LDY #1
1270 \
1280 .loop2
1290 \
1300 LDA chartable,Y
1310 BIT &75
1320 BEQ notset
1330 CLC
1340 LDA &77
1350 ADC &76
1360 STA &76
1370 \
1380 .notset
1390 \
1400 LSR &77
1410 INY
1420 CPY #9
1430 BNE loop2
1440 LDA #1
1450 JSR &FFEE
1460 LDA &76
1470 JSR &FFEE
1480 LDA &75
1490 LSR A
1500 STA &75
1510 CMP #0
1520 BNE loop1
1530 LDA #0
1540 STA &74
1550 INC &7C
1560 LDA &7C
1570 CMP #60
1580 BNE notcr
1590 LDA #13
1600 STA &73
1610 \
1620 .quit
1630 \
1640 LDA &72
1650 CMP #1
1660 BNE notcr
1670 LDA &73
1680 CMP #13
1690 BNE notcr
1700 LDA #0
1710 STA &7F
1720 STA &72
1730 LDA #13
1740 JSR &FFEE
1750 LDA #1
1760 STA &72
1770 SEC
1780 LDA #76
1790 SBC &7C
1800 STA &7D
1810 LDA #0
1820 STA &7C
1830 \
1840 .loop3
1850 \
1860 LDA #&8
1870 STA &7E
1880 \
1890 .loop4
1900 \
1910 LDA #1
1920 JSR &FFEE
1930 LDA #0
1940 JSR &FFEE
1950 DEC &7E
1960 LDA #0
1970 CMP &7E
1980 BNE loop4
1990 DEC &7D
2000 CMP &7D
2010 BNE loop3
2020 \
2030 .notcr
2040 \
2050 LDA #6
2060 LDX &73
2070 JSR &FFF4
2080 PLP
2090 PLA
2100 TAY
2110 PLA
2120 TAX
2130 PLA
2140 LDA &73
2150 \
2160 .exit
2170 \
2180 JMP (&70)
2190 ]
2200 NEXT
2210 OSCLI("*SAVE DRIVER"+
```

Program II

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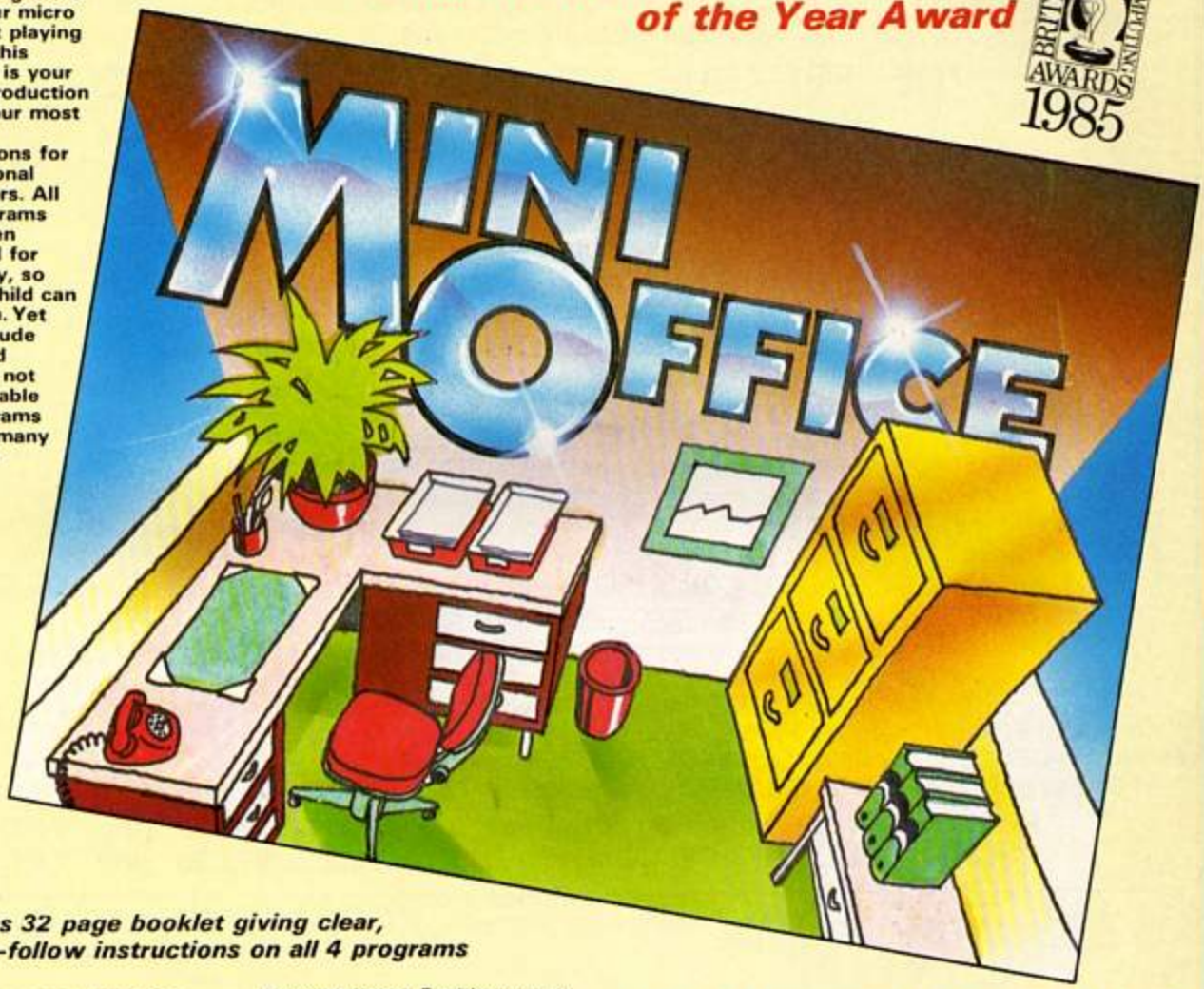

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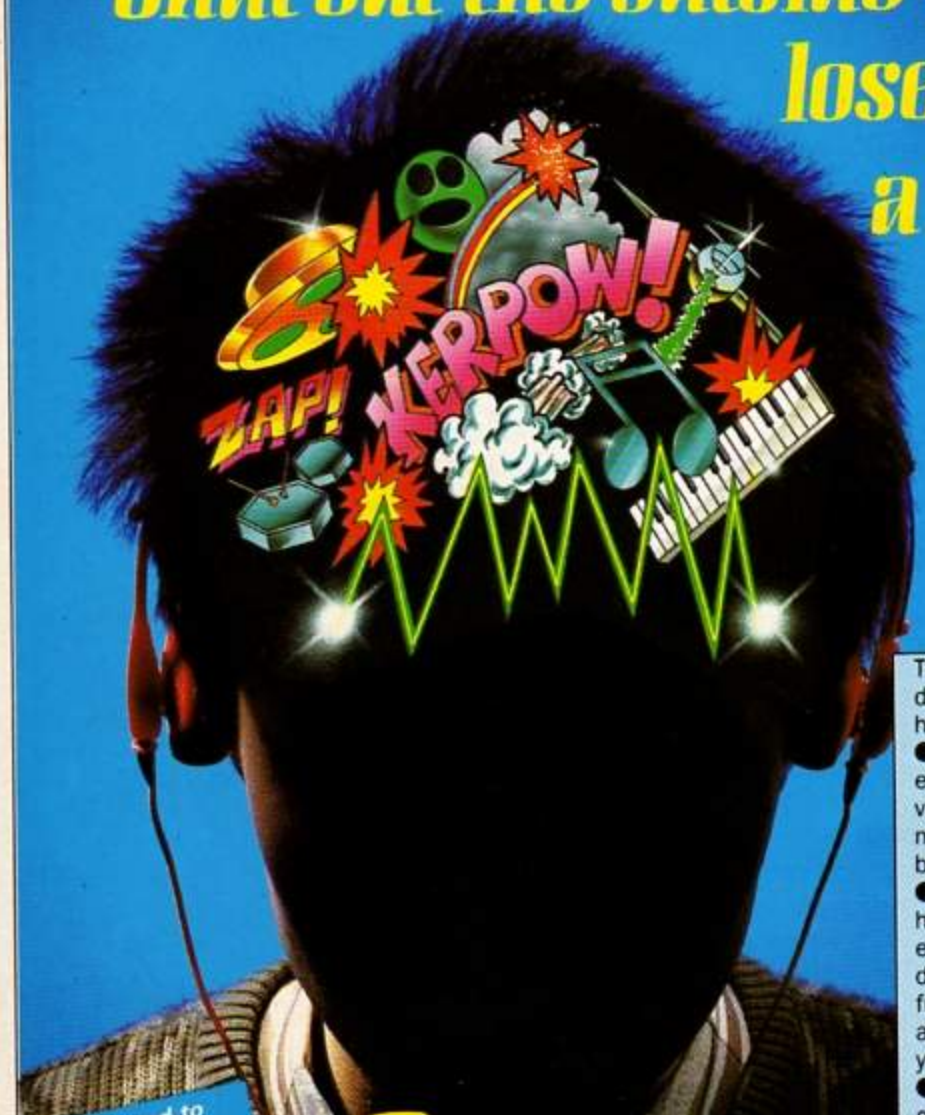

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EU3

Whether it's wet, or whether it's dry...

JOE PRITCHARD continues construction of his useful Electron weather station

LET'S start off this month by looking at the software for the temperature probe we built last time.

The easiest way to use the probe is to load Program II from last month's article and run it whenever you want a temperature reading. This can then be recorded on paper.

Of course, a more sophisticated way would be to use the facilities offered by the computer's filing system. Program I shows a simple method of recording a temperature reading and storing it in a file when it is run.

The data can then be printed out from the array using the Print option on the menu displayed. You might like to consider writing additional software to calculate the average temperature over a number of readings.

You could run this program twice a day – the array as it stands, would allow you to record 50 days' worth of readings.

A date and time at which the reading was taken can be recorded, along with the temperature, which is taken as an average over several readings from the ADC.

Option one from the menu – Initialise new files – allows you to set up a blank file, and this must be done before any readings can be taken. It writes a blank file out to the current filing system.

Option two – Write file – writes the array of temperature/date or time readings stored in the machine, out to a named file. This allows you to save temperature data.

Option three – Read a file from disc – allows you to read in an existing file from disc and use it. For instance, you could read a file in and print its contents out, or add further temperature readings to it.

Option four – Do a temperature reading – finds a space in the file automatically, and you are then prompted for a time or date by which you can identify the temperature reading.

Once this is in, the average temperature read back after 200 readings of the ADC is stored in the temperature array.

Option five – Print dates/temperature – lists the date/time information and the corresponding temperature to the screen. You can change this to send the information to a printer by inserting a VDU 2 at line 805 and a VDU 3 at line 885.

A further way of using the temperature sensor is to leave the computer running and get the machine to display the current temperature, and the maximum and minimum temperatures recorded since the program started running. Program II shows how this can be done.

A later part of this series will give listings for a suite of programs that will include versions of both these pieces of software.

We'll move on now to positioning the temperature sensor. We need to have it outdoors, but protected from the excesses of nature. It needs to be fairly dry, out

Turn to Page 45 ►

```
   10 REM Temperature Sensor
   20 REM By Joe Pritchard
   30 REM (c) Electron User
   40 :
   50 PROCinitialise:PROCinit_records
   60 REPEAT
   70 MODE 6
   80 PRINTTAB(10,10)" 1. Initialise NEW files"
   90 PRINTTAB(10,11)" 2. Write file to tape/disc"
  100 PRINTTAB(10,12)" 3. Read file from disc"
  110 PRINTTAB(10,13)" 4. Do a temperature reading"
  120 PRINTTAB(10,14)" 5. Print dates / temperature"
  130 PRINTTAB(10,15)" 6. Finish"
  140 PRINT"
  150 REPEAT
  160 INPUT "Which option? ",option
  170 UNTIL option>0 AND option<7
  180 IF option=1 THEN PROCinit_records:PROCwrite_records
  190 IF option=2 THEN PROCwrite_records
  200 IF option=3 THEN PROCread_records
  210 IF option=4 THEN PROCfind_blank_record:PROCmake_reading
  220 IF option=5 THEN PROCprint_records
  230 UNTIL option=6
  240 END
  250 :
  260 DEFPROCinitialise
  270 A%=&20209
  280 DIM date$(100),temperature(100)
  290 ENDPROC
  300 :
  310 DEFFNadval
  320 =INT(ADVAL(1)/256)
  330 :
  340 DEFFNtemperature
  350 counts_per_degree=6.4
  360 temp0=17
  370 =(FNadval-temp0)/counts_per_degree
  380 :
  390 DEFPROCfind_blank_record
  400 rec%=0
  410 REPEAT
  420 rec%=rec%+1
  430 IF rec%=101 test=1000 ELSE test=temperature(rec%)
  440 UNTIL test>998
  450 IF test=1000 CLS:PRINT TAB(10,10)"No more space in file"
  460 ENDPROC
  470 :
  480 DEFPROCinit_records
  490 FOR rec%=0 TO 100
  500 temperature(rec%)=999
  510 date$(rec%)=STRING$(30," ")
  520 NEXT rec%
  530 ENDPROC
  540 :
  550 DEFPROCwrite_records
  560 CLS
  570 REPEAT
  580 INPUTTAB(10,10) "Name of the file? ",name$
  590 UNTIL LEN(name$)<8 AND name$<>""
  600 Y%=OPENOUT(name$)
  610 FOR rec%=0 TO 100
  620 PRINT#Y%,date$(rec%),temperature(rec%)
  630 NEXT rec%
  640 CLOSE#Y%
  650 ENDPROC
  660 :
  670 DEFPROCread_records
  680 CLS
  690 REPEAT
  700 INPUTTAB(10,10) "Name of the file? ",name$
  710 UNTIL LEN(name$)<8 AND name$<>""
  720 Y%=OPENIN(name$)
  730 FOR rec%=0 TO 100
  740 INPUT#Y%,date$(rec%),temperature(rec%)
  750 NEXT rec%
  760 CLOSE#Y%
  770 ENDPROC
  780 :
  790 DEFPROCprint_records
  800 CLS
  810 pointer%=1
  820 rec%=1
  830 REPEAT
  840 IF temperature(rec%)<999 THEN PRINTdate$(rec%);TAB(34);temperature(rec%)
  850 rec%=rec%+1
  860 pointer%=pointer%+1
  870 IF pointer%=20 THEN PRINT:PRINT "Press Space to go on":REPEAT UNTIL GET=32:pointer%=1:CLS
  880 UNTIL temperature(rec%)>998 OR rec%=100
  890 INPUT "Press RETURN to go on",a$
  900 ENDPROC
  910 :
  920 DEFPROCmake_reading
  930 CLS
  940 INPUTTAB(5,10)"Date/Time ",date$(rec%)
  950 FOR readings%=1 TO 200
  960 temperature(rec%)=temperature(rec%)+FNtemperature
  970 NEXT readings%
  980 temperature(rec%)=temperature(rec%)/200
  990 ENDPROC
```

Program I

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```
   10 REM Temperature Sensor
   20 REM By Joe Pritchard
   30 REM (c) Electron User
   40 :
   50 MODE 6
   60 PROCinitialise
   70 PRINTTAB(5,8);"Current
 temperature "
   80 PRINTTAB(5,10);"Maximu
m temperature "
   90 PRINTTAB(5,12);"Minimu
m temperature "
  100 REPEAT
  110 current_reading=FNtemp
erature
  120 PROCmini_max
  130 PROCprint_values
  140 UNTIL FALSE
  150 :
  160 DEFFNadval
  170 =INT(ADVAL(1)/256)
  180 :
  190 DEFFNtemperature
  200 counts_per_degree=6.4
  210 temp0=17
  220 =(FNadval-temp0)/count
s_per_degree
  230 :
  240 DEFPROCmini_max
  250 IF current_reading>max
_temp THEN max_temp=current_
reading
  260 IF current_reading<min
_temp THEN min_temp=current_
reading
  270 ENDPROC
  280 :
  290 DEFPROCprint_values
  300 PRINTTAB(27,8)current_
reading;" C"
  310 PRINTTAB(27,10)max_tem
p;" C"
  320 PRINTTAB(27,12)min_tem
p;" C"
  330 ENDPROC
  340 :
  350 DEFPROCinitialise
  360 min_temp=FNtemperature
  370 max_temp=FNtemperature
  380 @%=&20209
  390 VDU23,1,0;0;0;0;
  400 ENDPROC
```

Program II

◄ *From Page 43*

of draughts, but still able to follow changes in the outside air temperature.

Figure I shows a possible enclosure for the temperature probe.

The size isn't important, but it's a good idea to make it around 30cm square. This allows other bits and pieces to be mounted inside as well.

The electronics are probably best kept indoors; as well as keeping them dry and out of harm's way, it simplifies the wiring. As to positioning the box outside, keep it out of direct sunlight if possible, as on a summer day the temperature sensor would show a much higher temperature than actually present.

Also don't run too much cable between the sensor and the amplifier.

Humidity is a measure of the amount of water vapour in the air. The higher the humidity, the more water vapour there is in the air.

The close, sticky weather associated with thunderstorms in summer is a typical example of what to expect when the humidity is high.

Measuring it isn't as difficult as it sounds, and there are two ways in which we can go about it.

The wet and dry thermometer is shown in Figure II. We use two temperature measuring circuits, with one of the sensor diodes covered with a piece of felt or cloth leading to a small container of water. This is the wet thermometer.

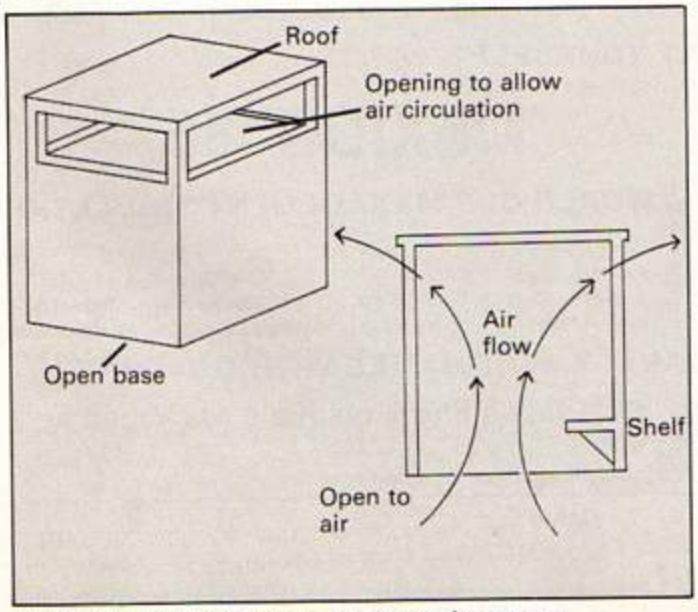

Figure I: Housing the Electron weather station sensors

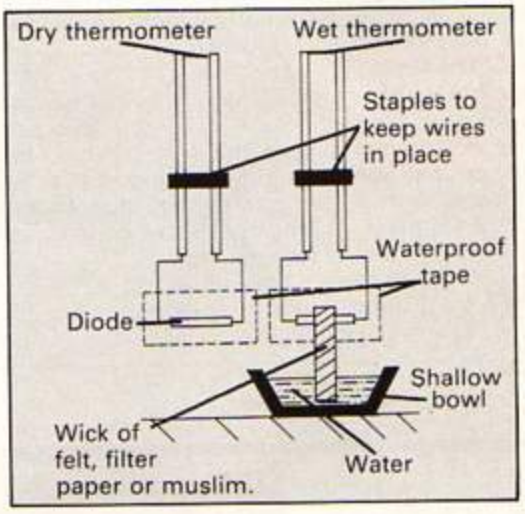

Figure II: The wet and dry thermometers for measuring humidity

The other one is the dry thermometer. Under most circumstances, there is a difference in temperature read by the two thermometers, and the difference depends upon the humidity.

The wet and dry thermometer method of measuring humidity works due to the fact that water will be constantly evaporating from the wick covering the wet diode. This cools it down and so the temperature read here will be lower than that on the dry sensor.

The size of the difference depends upon the amount of water evaporating. The higher the humidity, the less water will evaporate from the wick and so the smaller the temperature difference will be.

In practical terms, we simply build a second thermometer circuit. You can connect this one up to channel one of the ADC, rather than channel zero.

Don't forget to alter the software to read channel one rather than channel zero.

The biggest problem is making sure the two thermometer circuits return identical readings over a range of temperatures when both the diodes are dry.

This can be done by carefully adjusting the preset resistor in the temperature sensor circuit and by making allowances in the software.

Of course, much of the allowances in the software will be taken care of when you calibrate the second thermometer, as described last time.

Once the readings are the same with both diodes dry, you can put the wick on one of them and see how the temperature varies with humidity.

It may be quite difficult to get the diodes to produce the same readings at a wide range of temperatures.

Not only will the diodes differ a little, but there is likely to be a difference in the amount of amplification given by the operational amplifier to the signal returned from the diode.

However, these problems can largely be cancelled out with the calibration process, as follows:

● If one thermometer circuit constantly reads low by a varying amount over a range of temperatures, try altering the value of *counts_*

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Hardware Projects

◀ *From Page 45*

per_degree in FNtemperature while calibrating.

● If the difference is a constant value over the range, then change the *temp0* value in FNtemperature.

Once working, the difference between the wet and dry temperatures is called the depression of the wet bulb.

This should always read lower than the dry one, and the greater the depression the less humid the air.

When in use, the wet and dry diodes should be kept as close to each other as possible, and should be as similar to each other as possible, with the exception that one diode has the wet wick over it and the other is kept dry.

The plastic tape in the diagram serves to prevent splashes of water from short circuiting the wires leading to the diode. Both diodes should be kept out of direct sunlight, rain and draughts. The enclosure shown in Figure I will fulfill this condition.

The water needs to be kept topped up, as eventually it will evaporate.

A quicker, cheaper, but less effective method of measuring humidity is to use the apparatus shown in Figure III. This relies upon the salt absorbing water vapour from the air and so becoming more electrically conductive.

However, it isn't very sensitive. It will respond quite well to you breathing onto the salt crystals, but humidity changes that we might expect due to the weather in this country are less marked.

You might like to try this as an experiment, but the results aren't too good without an operational amplifier circuit to boost the resistance changes.

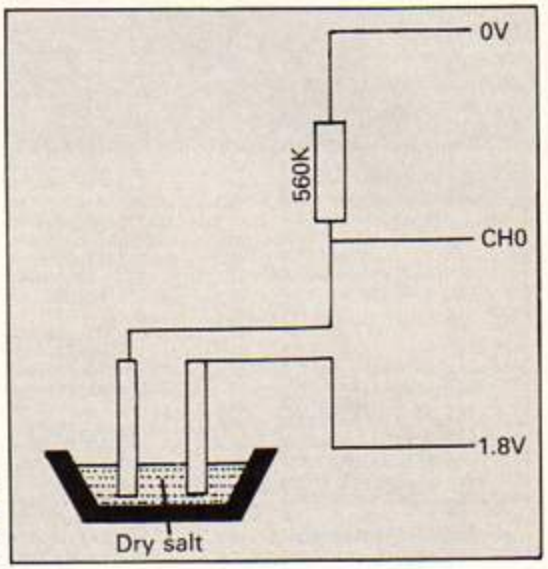

Figure III: Using salt to measure humidity

A further disadvantage of this method of measuring humidity is that the salt soon gets waterlogged, and will no longer return sensible results. When this happens, you'll have to replace the salt.

● *Next time, we'll see how we can measure windspeed and direction.*

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MICRO MESSAGES

Teachers have problems, too

I AM writing in response to the letter from R. H. Hill in the January 1988 issue of Electron User *concerning the use, or lack of use, of computers in education. To paraphase Mr. Hill, I am not very impressed.*

His accusations are wrongly directed and his attitude towards schools and teachers is offensive.

Mr. Hill says he regards himself in such a position as gives him a right to preach.

He hammers on school doors, suggests they lack determination and imagination, accuses schools of using their capitation recklessly and of not being concerned about their pupils' prospects, and suggests that schools are not taking steps to accommodate future advances.

I am a teacher totally sold on the idea of introducing computers into the classroom. I envisage an ideal in which all pupils are supplied with a terminal and almost all work is done through the computer.

As an English teacher I did at first have some qualms about the swamping of creativity through technology, but I no longer believe this to be the case.

Word processors will aid creativity mainly because of their ability to join or divide sections of an essay, replace words and sentences and format the finished product. Moreover, the technical side of the subject is ideally suited to computerisation.

I also believe, and have suggested, that all marks and records be recorded on databases and spreadsheets. The latter can be used to help pinpoint the strengths and weaknesses of individual pupils.

I have written various letters to software houses, advisers and companies. I have attempted to use the school's computers for producing a newspaper and as an electronic display board. However, the result of all this is very slight.

In short I too, Mr. Hill, have hammered on doors – without presuming to preach – but the result, from my side of the fence, has been equally frustrating.

How can schools be in a position to utilise computers when we do not have the money, time, security, mains sockets, furniture, support, technical help or training?

Teaching is a full-time job and all ideas are on top of, never instead of, classroom teaching.

Furthermore, computers do not need to be pushed, as their worth is self-evident.

The reason I have not been able to implement the above ideas is because they cannot be done in a classroom with a single power socket which does not always work, walls through which a fist could be forced, and absolutely no security.

My situation is quite typical. Ultimately, where does the money come from? Is it my job to support an innovation – which Mr. Hill has likened to a second Industrial Revolution – through holding a car boot sale?

How many jumble sales has Mr. Hill's business held to raise funds for itself? – or is it that education with all of its aspects, and the second industrial revolution are only important to warrant jumble sales?

I am not at all impressed, Mr. Hill. – **P.F. Doran B.A., Little Sutton, South Wirral.**

● Both sides of this argument seem to have been well covered, but we would tend to agree with Mr. Doran that it is unfair to level criticism at our overworked, underfunded teachers and schools for the lack of widespread, proper computer access for pupils.

Desk diary on disc

AS Electron databases go, I have found Acornsoft's Desk Diary much the friendliest and most useful. It would become even more valuable if I could transfer it easily to disc.

I realise it is protected, but I would be glad if you or any of your readers could tell me if there is a way of listing it for transfer to disc.

Alternatively, would Acorn reveal the secret, since they are unlikely to issue further Electron databases on disc? – **Bernard Causden, London.**

● Acorn is unlikely to divulge the secrets of its protection techniques. However, there is a utility available which should do the job for you.

Slogger produce the T2P3 rom, which transfers protected tapes to Plus 3 discs. If you have a Plus 4, you will need T2P4 instead.

The roms protect the software on disc and it is instantly recognisable as a T2P3 or T2P4 file. It won't run without the roms being present, so discouraging piracy.

You will need a rom cartridge and a Plus 1, or Slogger's Rombox Plus, in which to place the rom.

Card swap crashes

IS there a bug in the Newmarket listing published in the January 1988 issue of Electron User*? Approximately four times out of five, if I want to swap hands, the program freezes during the swap routine and I have to press Break and start again.*

The fifth time it works perfectly and the game can proceed without a hitch. If I decide not to swap, the game always works okay.

Putting an error report at line 20 gives the message Bad DIM at line 180. *As the game does work sometimes I don't know what is wrong – any ideas?* – **N. Gill, Camberley, Surrey.**

● Your problem lies in the value of the variable *Z* when the program reaches line 180. Something is causing it to be unrealistically high, forcing the DIM statement to be rejected.

Check lines 160 and 170 to see that you haven't mistyped *Z* as something else.

What a clock-up!

WHOEVER made the mistake in the clock program listing in the January 1988 issue of Electron User *does not deserve 40 lashes, but perhaps two would be in order*

Turn to Page 48 ►

◀ From Page 47

for the two mistakes present.

In lines 830 and 860 there should be an apostrophe before the inverted comma.

The result is that the prompt "Enter hours" prints too high, and there is no gap between the prompts "Enter seconds" and "Press a key". Not serious mistakes, because even I know how to remedy it, but mistakes nonetheless.

A much more serious mistake, and one which I have not been able to remedy (I have tried VDU 28, and inserted apostrophes at all possible places) is that the clock display in the top right hand corner is unreadable because its top half is out of the screen frame.

Since you promise to publish all mistakes and therefore the ones I have pointed out, you might also like to publish how the clock display can be lowered. – **P. Eisler, London.**

● Thank you for drawing our attention to the two missing apostrophes. Apologies are due to those who, unlike P. Eisler, were unable to correct the listing.

However, there is no mistake elswhere in the listing. Your problem stems from the fact that you probably use a television with your Electron rather than a monitor.

For some reason, the UHF output from the Electron produces a picture that is slightly too high for many TVs, and there is no equivalent of the BBC Micro's *TV command to rectify the situation.

Ask a TV engineer to lower the top of your television picture.

Spotting the socket

AS a French reader of your magazine, I am always grateful for the information contained in Electron User *each month. Having added a Plus 1 to my Electron and filled both sockets with a Cumana disc interface and the View cartridge, I am left with no space for my NTQ multi-font rom.*

Is there no solution other than changing my Plus 1 for Slogger's Rombox Plus? – **Serge Courouau, Paris, France.**

● If you look inside your Cumana interface you will find an empty rom socket into which your NTQ rom will fit. You could then buy a 32k battery backed ram cartridge from ACP and place View in one 16k bank.

You will then not only be able to use NTQ with View and your disc drive, but you will still have one spare 16k bank of ram inside the cartridge for other roms.

ALL programs printed in this issue are exact reproduction of listings taken from running programs which have been thoroughly tested.

However on the very rare occasions that mistakes may occur corrections will be published as a matter of urgency. Should you encounter error messages when you type in a program they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

MicroLink mystery

FIRSTLY a word of explanation. I am a doddery old bird, with precious little to do with my time other than typing out the programs published in Electron User.

I derive considerable pleasure from typing and correcting my mistakes, to arrive eventually at a working program. I have had a number of successes, which I will not gloat over, and my fair share of failures too.

Firstly, you quote time and time again: "This is one of hundreds of programs now available FREE for downloading on MicroLink". What in heaven's name is this? Where is it? Does downloading mean typing on to tape?

Secondly, because there are only 10 lines in your Disabler program from the August 1987 issue, I am fairly confident that I haven't made a mistake, but I still get Bad command *at line 6. I am prepared to donate 9p to the charity of your choice if I am wrong.*

Thank you for your publication, but publish it twice a month to keep me busy. – **F.A. Wyeth, Congleton, Cheshire.**

● MicroLink is an electronic database accessed via the telephone. You need an RS423, modem and software to use it – Slogger and Pace can supply this.

A modem is a device which couples your computer to the phone line, through which the information travels.

MicroLink provides many services to subscribers, including the one you mentioned – telesoftware. Every program published by *Electron User* is stored in the MicroLink main computer, and can be transferred down the telephone line into any computer in the country using the right equipment. It is this process which is known as downloading.

Your problem concerning the Disabler 10 liner is due to the fact that you do not have a Plus 3, which is the Acorn disc drive unit.

Line 6 attempts to issue two star commands to this unit, *MOUNT and *DIR, and the Electron will return the *Bad command* error if the Plus 3 is not present.

And as for publishing *Electron User* twice a month, we're overworked enough as it is!

Electrons obsolete?

EVERY month in your excellent magazine I read about an upsurge in sales and interest in the Electron computer. I would however, be grateful for the real truth.

I have tried most shops in the Hull area for an Electron, to be greeted by a variety of comments. These range from "We just don't sell it" to "They're an old machine".

How can there be an upsurge if you can't buy the machine? I would be grateful for your comments, and information of anyone in Hull who stocks the Electron. I do own one, but am looking to replace it because of a fault. – **Mrs R. Pearlman, Hull, N. Humberside.**

● The Electron is far from obsolete. Although difficult to find in the shops, there are stocks and you can buy one by mail order direct from Slogger – £64 for a standard model and £99 for one fitted with an additional 32k of ram and turbo driver.

Ziggy's bad habits

I WOULD like to thank Electron User *for publishing my program Ziggy in the January issue. My main reason for writing this letter is to apologise to your readers for the programming styles employed.*

Many people will not have realised that Ziggy was actually written as a program for Electron User's *10 Liner feature, and that somebody in the editorial department actually unravelled it from 10 lines of Basic to 96. (Incidentally, my congratulations to the person who untangled my twisted program logic.)*

However, the program code is almost exactly the same as when it was a 10 Liner. Electron User *has simply inserted new lines to break it up, presumably to make it easier to read.*

Unfortunately, some of the bodges which I felt were acceptable in order to squeeze the program into 10 lines look awful in a properly laid out program and I would appeal to everyone to ignore my programming style and not pick up any of my bad habits!

In particular line 540 is a bit dodgy, and the exit from PROCpseg *in line 920 is very*

messy. Furthermore, my use (or abuse) of REPEAT/UNTIL looping in the main program is enough to make GOTO look structured.

I'd also like to comment on Electron User's *recommendation that the program be run in Mode 2 instead of Mode 5 if it is found to be too fast.*

I admit the game is fast, but this is really one of its main attractions – it becomes rather pointless if slowed down.

If anyone does find it too fast, a better solution is to change it back to Mode 5 and add the line:

```
905 *FX 19
```

This takes the edge off the game's speed without making it too slow to be fun.

Finally I'd like to thank David Walton (Micro Messages, January 1988) for his answer to my ViewSpell query. – **Neil Hoggarth, St. Cross, Winchester.**

● We think the reason for suggesting the game be slowed down was because the poor old Editor couldn't hack the pace!

The game was expanded because it was too good for a 10 Liner and deserved a full page on its own.

JP-101 printer solution

REGARDING Greg Cassar's problems when using the Acorn/Olivetti JP-101 printer with a driver created by the Printer Driver II program (Micro Messages, January 1988), I can confirm that the JP-101 can produce both the underline and double height print styles.

When the codes are being entered in response to the prompts, enter ESC and follow it with the Ascii codes in decimal, separated by commas. This will avoid most typing mistakes caused by missed quotes and so on.

I have found, however, that when using the JP-101 with View it is not possible for double height mode to be turned on or off part-way along a line, despite what is stated in the JP-101 user manual.

Double height mode must be turned on by calling up the appropriate highlight at the start of a line, and cancelled by placing the highlight at the start of the line following the last line of double height print.

It is possible to have double height style operating simultaneously with another print style, provided double height is turned on before the other style, and cancelled after it.

The table shows a list of codes for the JP-101 printer – **F. Anderson, Stirling, Scotland.**

Print styles for JP-101	
Underline ON	ESC,42,48
OFF	ESC,43
Double underline ON	ESC,42,49
OFF	ESC,43
Dash underline ON	ESC,42,50
OFF	ESC,43
Condensed (12/inch) ON	ESC,61
OFF	ESC,60
Condensed (18/inch) ON	ESC,62
OFF	ESC,60
Double width ON	ESC,51
OFF	ESC,52
Double height ON	ESC,39
OFF	ESC,37

● This letter is typical of the dozens which flooded our office following Greg Cassar's letter in the January 1988 issue.

Thanks to all of you who wrote in, it shows how many loyal JP-101 owners there are out there.

The reader who couldn't get the driver to produce NLQ on his dot matrix printer should look up the codes in the manual and enter them as ESC, followed by decimal codes only.

Amstrad conversion?

OVER Christmas I bought a Smith-Corona Fastext-80 dot matrix printer. I am having success in printing letters and documents using Mini Office, but I am being increasingly frustrated because I can't reproduce screen dumps.

However, my uncle has given me a screen dump program from his Amstrad DMP 3000 printer manual.

We have managed to convert most of it into BBC Basic, but there are two commands we can't convert. They are XOR and TEST. Can you or any other readers help? – **Robert Cooper, Thatcham, Berkshire.**

● The BBC Basic equivalent of XOR is EOR, while TEST x,y becomes POINT (x,y).

However, although the Amstrad and Electron both use very similar screen modes, the number of pixels present and graphics coordinates used are different for each micro, so you may encounter some additional problems.

In the June 1986 issue of *Electron User* is an article on producing screen dumps, which contains some programs you can use instead of the converted Amstrad listing.

Frustrated driver

AFTER being a subscriber to your magazine for more than two years I must say that all of the listings such as Grebit and Dungeon Quest I have ever typed in have all worked.

So I find it puzzling and frustrating that a short program like Printer Driver II – published in the August 1987 issue – should cause me so much trouble.

After reading the letter from Greg Cassar in the January 1988 issue about using this driver with an Olivetti JP-101 printer, which I own, I set about typing in the listing.

After days of checking it through, I still come up with the same conclusion, which is that the program is either faulty or incomplete.

The error message No such variable at line 760 *appears when the code is entered for turning highlights off, and if the Return key is pressed without entering a pad character the program returns the error message* Byte at line 400.

Enclosed with my letter is a photocopy of the magazine listing together with a printout of my version. As you can see, they are identical – but the program still won't run properly – **M. Taunton, Bridgwater, Somerset.**

● Yes, the listings are indeed identical. However, there is no fault as such in either listing.

What is happening is that when you enter a highlight code, the program uses Basic's EVAL function to interpret whatever format the input was in. This allows you to use decimal, hex, characters and so on.

However, EVAL does much more than this. It will attempt to return the value of a named variable passed to it, and if the variable has not been defined elsewhere then it will generate the No such variable *error.*

Therefore the reason you are receiving this error must be because you have entered the codes in a form which is not understood by the program, and part of it is instead interpreted as a variable.

As for the other error, you must always give a pad character. It doesn't have to be used, but if you simply press Return you are entering a null string which, of course, cannot return an Ascii value.

To prevent this occurring, add the following line to the program.

```
75 IF pad$="" pad$="£"
```

If you use the £ symbol elsewhere in your text, simply insert another less frequently used character in line 75.

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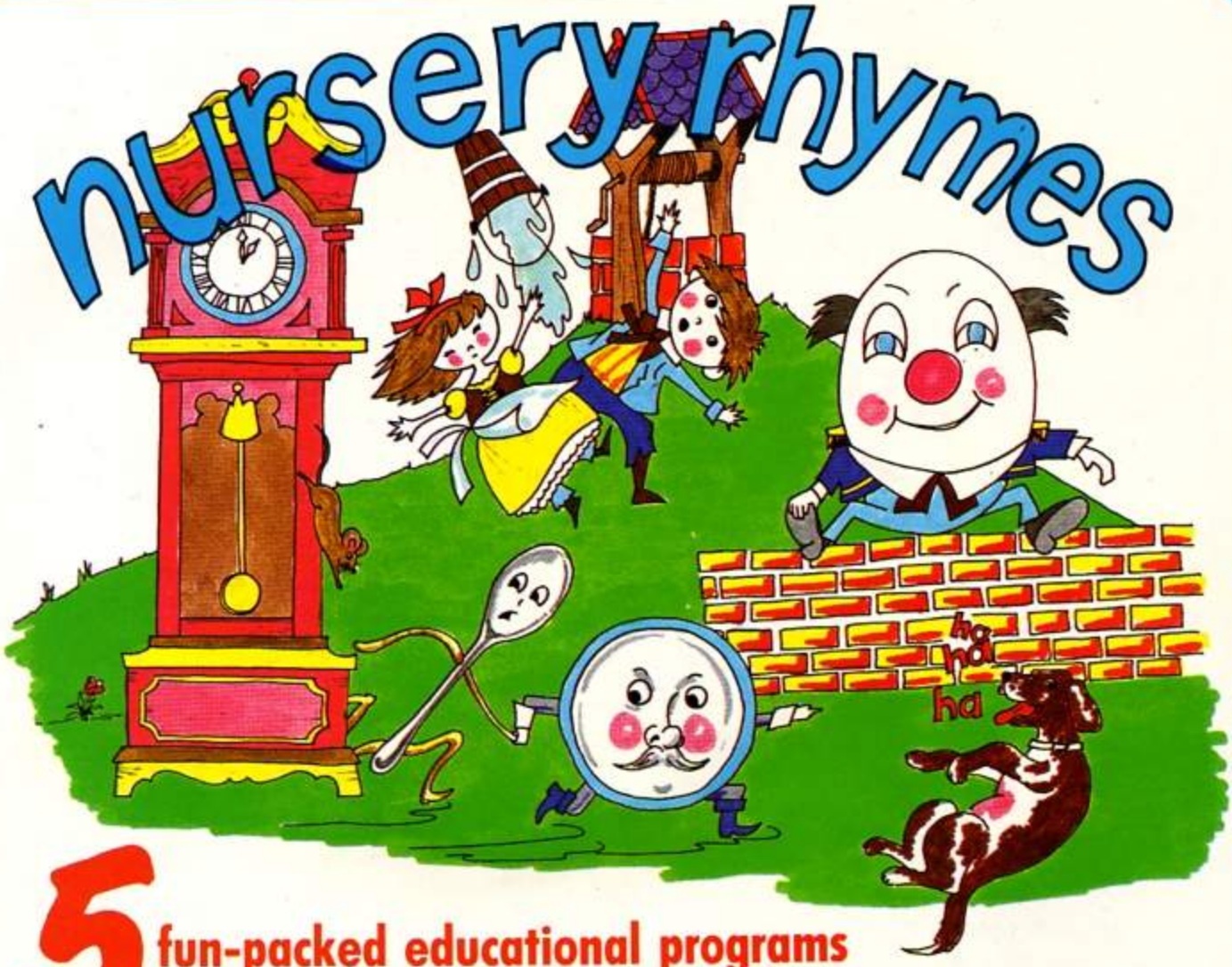

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Add a bit of fizz with CHRIS NIXON's extremely handy beer kit handbook

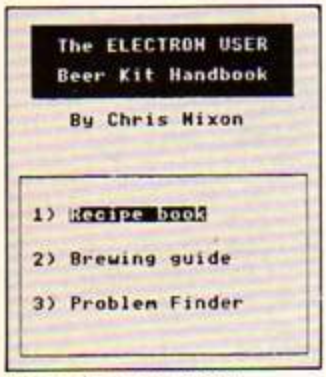
HOME brewing is quite a difficult art to master effectively, despite the claims found on the instruction labels of some beer kits.

There is such a bewildering collection of hints and techniques to learn, and anyone who has ever dabbled in this time-honoured hobby will sympathise with the first time brewer.

The Beer Kit Handbook is therefore designed as a stand-by reference and cataloguing system for the newcomer to the art, although the recipe section would be useful to any beer hobbyist.

When you run the program, you are presented with the main menu, which offers three options – recipe book, brewing guide and problem finder. Pressing the spacebar scans through the menu, and the Return key selects the currently highlighted option.

The recipe book uses a disc file to store all your favourite formulae for good beers in a compact, easily retrievable form – so you must have a disc drive to use this utility.



The main menu screen

The recipe book presents you with another menu of three options – find a recipe, add a recipe and print a recipe.

Because there is as yet no recipe file to search through, we'll first create one and add a recipe to it. Select option two, and you will be asked for the beer type. Answer with bitter, lager, ale or whatever.

Next you are asked for the beer's name. This would be whatever variety is on the kit's label, such as Extra-strong, Old fashioned and so on.

Next, you are prompted for the original gravity. This is the gravity obtained before fermentation starts, and should be around 1038 for best bitters, or 1040 and upwards for a lager.

The final gravity is asked for next, and is the gravity obtained immediately before bottling. It should be close to the 1000 mark to indicate successful primary fermentation.

You now have eight lines of text with which to enter all the ingredients. Unless you are trying for a very fancy brew, this should more than suffice.

Press Return at the end of each line, and if there are some lines left spare press Return until you are prompted for the method.

This time you have 12 lines in which to enter the method. Proceed as for the ingredients, and when the final line has been entered the whole recipe will be saved to disc.

If it is the first time you have used the program, a new file will first be opened before the recipe is stored.

To retrieve a recipe for either casual scanning or printing out, select option one or three respectively from the recipe book menu.

The procedure is the same for both – you are asked first for the type, and then the name, of the beer you want.

The whole file is scanned, and if no matching beer is found the computer will beep, and you will be returned to the program's main menu.

If a match was found and you selected the Find option, your recipe will appear neatly on the screen, otherwise it will be printed – so make sure that the printer is on, and at the top of a new page, before selecting option three.

You will notice at this stage that the program has performed a rough calculation of the percentage alchohol content in the beer, based on the original and final gravities entered.

The two remaining options on the main menu are for reference only. The brewing guide displays the complete general method for brewing a wet kit, which is the sort of kit available in most supermarkets in the form of a tin of liquid malt or barley, mixed with other ingredients such as hop extract.

The brewing method is split into five concise, easy-to-follow stages and applies to virtually all wet kits. But always read the instructions on your tin, just in case they vary in some important detail.

The problem finder is for when your brew has failed, or developed problems. Selecting this option lists six possible symptoms, of which one or more should apply to all problems.

Press the key corresponding to a symptom which you have observed in your beer, and a short list of possible causes and remedies will appear.

That just about covers using the Beer Kit Handbook. It should prove helpful to most home brewers, and my recipe book has certainly found new life in its computerised form.

```
  10 REM Beer Kit Handbook
  20 REM By Chris Nixon
  30 REM (C) Electron User
  40 REM
  50 ONERROR GOTO 930
  60 *K.10 CLOSE#0M
  70 MODE4:PROCsetup:REPEAT
:CLOSE#0
  80 PROCmenu:UNTIL0
  90 DEFPROCsetup:DIMmenu$(
1,2),ing$(7),meth$(11):FORX%
=0TO1:FORY%=0TO2:READmenu$(X
%,Y%):NEXT:NEXT:ENDPROC
 100 DEFPROCmenu:CLS:PROCcs
r(0):COLOUR129:COLOUR0:FORY%
=0TO4:PRINTTAB(10,Y%)STRING$
(21," "):NEXT:PRINTTAB(12,1)
"The ELECTRON USER"TAB(12,3)
"Beer Kit Handbook":COLOUR12
8:COLOUR1
 110 PRINTTAB(13,6)"By Chri
s Nixon":PROCscan(0):ON Y%GO
TO120,130,140
 120 PROCrecipe:ENDPROC
 130 OSCLI"FX21":PROCguide:
ENDPROC
 140 OSCLI"FX21":PROChelp:E
NDPROC
 150 DEFPROCscan(N%):MOVE28
8,256:DRAW1024,256:DRAW1024,
642:DRAW288,642:DRAW288,256:
COLOUR128:COLOUR1:FORY%=0TO2
:PRINTTAB(10,Y%+3+14)STR$(Y%
+1);") ";menu$(N%,Y%):NEXT:Y
%=0
 160 COLOUR129:COLOUR0:PRIN
TTAB(13,Y%+3+14)menu$(N%,Y%)
:TIME=0:REPEAT:UNTILTIME>700
RNOTINKEY(-99):REPEAT:I%=INK
EY(-99):J%=INKEY(-74):UNTILI
% OR J%:IF J% Y%=Y%+1:COLOUR
128:COLOUR1:ENDPROC
```

```
  170 COLOUR128:COLOUR1:PRIN
TTAB(13,Y%*3+14)menu$(N%,Y%)
:Y%=Y%+1:IFY%=3 Y%=0
  180 GOTO160
  190 DEFPROCrecipe:CLS:PROC
csr(0):PROCheader("Beer Reci
pe Book"):PROCscan(1):ONY%GO
TO200,210,220
  200 PROCfind:ENDPROC
  210 PROCadd:ENDPROC
  220 PROCprint:ENDPROC
  230 DATA"Recipe book","Bre
wing guide","Problem Finder"
,"Find a recipe","Add a reci
pe","Print a recipe"
  240 DEFPROCheader(A$):COLO
UR129:COLOUR0:L%=19-LENA$/2:
FORY%=0TO2:PRINTTAB(L%,Y%)ST
RING$(LENA$+2," "):NEXT:PRIN
TTAB(L%+1,1)A$:COLOUR128:COL
OUR1:ENDPROC
  250 DEFPROCfind:CLS:PROCcs
r(1):PROCheader("Find a Reci
pe"):*FX21
  260 INPUT"Beer type ",t
$:INPUT"Beer name ",n$:PRI
NT"Please wait...";
  270 CH%=OPENUP"RECIPES":RE
PEAT:REPEAT:PROCget:UNTIL(ty
pe$=t$ AND name$=n$)OR EOF#C
H%
  280 IF NOT(type$=t$ AND na
me$=n$) UNTILEOF#CH%:CLOSE#0
:VDU7:ENDPROC
  290 PROCdisplay(0):*FX21
  300 REPEAT:UNTILINKEY(-99)
:UNTILEOF#CH%:CLOSE#CH%:ENDP
ROC
  310 DEFPROCget:INPUT#CH%,t
ype$:INPUT#CH%,name$:INPUT#C
H%,og%:INPUT#CH%,fg%:INPUT#C
H%,vol%:FORL%=0TO7:INPUT#CH%
,ing$(L%):NEXT:FORL%=0TO11:I
NPUT#CH%,meth$(L%):NEXT:ENDP
ROC
  320 DEFPROCread:INPUT#CH%,
d$:INPUT#CH%,d$:INPUT#CH%,d%
:INPUT#CH%,d%:INPUT#CH%,d%:F
ORL%=0TO19:INPUT#CH%,d$:NEXT
:ENDPROC
  330 DEFPROCadd:CLS:PROCcsr
(1):PROCheader("Add a recipe
"):*FX21
  340 INPUT"Beer type ",t
ype$:INPUT"Beer name ",name$
:INPUT"Original gravity ",og
%:INPUT"Final gravity ",fg%:
vol%=(og%-fg%/7)
  350 PRINT"Now enter 8 lin
es of ingredients"
  360 FORL%=0TO7:PROCosword:
ing$(L%)=A$:NEXT
  370 PRINT"Now enter 12 li
nes of method"
  380 FORL%=0TO11:PROCosword
:meth$(L%)=A$:NEXT
  390 CH%=OPENUP"RECIPES":IF
 CH%=0 PROCcreate:PROCput:CL
OSE#0:ENDPROC
  400 REPEAT:PROCread:UNTILE
OF#CH%:PROCput:CLOSE#0:ENDPR
OC
  410 DEFPROCosword:!&C00=&C
80:?&C02=40:?&C03=32:?&C04=1
27:A%=0:X%=0:Y%=&C:CALL&FFF1
:A$=$&C80:ENDPROC
  420 DEFPROCput:PRINT#CH%,t
ype$:PRINT#CH%,name$:PRINT#C
H%,og%:PRINT#CH%,fg%:PRINT#C
H%,vol%:FORL%=0TO7:PRINT#CH%
,ing$(L%):NEXT:FORL%=0TO11:P
RINT#CH%,meth$(L%):NEXT:ENDP
ROC
  430 DEFPROCcsr(C%):VDU23,1
,C%;0;0;0;:ENDPROC
  440 DEFPROChelp:CLS:PROCcs
r(1):PROCheader("Beer Kit Pr
oblem Finder"):VDU28,0,31,39
,4
  450 PRINT"HAS:""1) B
eer stopped fermenting"
  460 PRINT"2) Beer develope
d sour taste"
  470 PRINT"3) Beer develope
d yeasty taste"
  480 PRINT"4) Beer become t
oo gassy"
  490 PRINT"5) Beer become t
oo flat"
  500 PRINT"6) Beer stayed t
oo cloudy"
  510 COLOUR129:COLOUR0:PRIN
TTAB(13,24)"Press 1-6...";:C
OLOUR128:COLOUR1
```

This is one of hundreds of programs now available FREE for downloading on

MicroLink

In addition to these many BBC Micro programs will also run on the Electron.

```
  520 REPEAT:G%=GET-48:UNTIL
G%>0 AND G%<7:ONG%GOTO530,59
0,650,700,730,830
  530 CLS:PRINT"Fermentati
on has ceased because either
:"
  540 PRINT"1) The bin temp.
 has risen above 26 C"
  550 PRINT"2) The bin temp.
 has fallen below 20 C"
  560 PRINT"3) Insufficient
 yeast was used"
  570 PRINT"4) The sugar qty
 is less than 1KG/40pts"
  580 PROCpause:ENDPROC
  590 CLS:PRINT"The beer t
astes sour because either"
"
  600 PRINT"1) Scum was left
 to collect on bin froth"
  610 PRINT"2) Equipment was
 not thoroughly sterile"
  620 PRINT"3) The ave. bin
 temp. rose above 26 C"
  630 PRINT"4) Seddy in bin
 or bottles was disturbed"
  640 PROCpause:ENDPROC
  650 CLS:PRINT"The beer t
astes yeasty because either
"
  660 PRINT"1) The final gra
vity was above 1010"
  670 PRINT"2) Not enough pr
iming sugar used"
  680 PRINT"3) Too much yeas
t used"
  690 PROCpause:ENDPROC
  700 CLS:PRINT"The beer i
s too flat because"
  710 PRINT"1) Too much prim
ing sugar used"
  720 PROCpause:ENDPROC
  730 CLS:PRINT"The beer i
s too flat because either"
"
  740 PRINT"1) Not enough pr
iming sugar used"
  750 PRINT"2) Not enough ye
ast added to wort"
  760 PRINT"3) Yeast under-f
ermented"
  770 PRINT"4) Av. bin temp.
 allowed to drop too far"
  780 PROCpause:ENDPROC
  790 CLS:PRINT"The beer i
s too cloudy because either"
"
  800 PRINT"1) Bin not stood
 before bottling"
  810 PRINT"2) Sediment in b
in or bottle disturbed"
  820 PRINT"3) Beer is natur
ally cloudy - use fining"
  830 PROCpause:ENDPROC
  840 DEFPROCpause:COLOUR129
:COLOUR0:PRINTTAB(12,24)"Pre
ss space bar";:COLOUR128:COL
OUR1:REPEATUNTILINKEY(-99):V
DU28,0,31,39,0:ENDPROC
  850 DEFPROCguide:CLS:PROCc
sr(0):PROCheader("Quick WET
KIT Brewing Guide")
  860 PRINT"1) Sterilise A
LL equipment thoroughly. U
nless stated otherwise, empt
y tin into 5 pint saucepan
 and add 4 pints of boilin
g water. Bring to boil and a
dd 1KGgranulated sugar. Boil
 for 15 minutes & tip into
 bin.";
  870 PRINT"Top bin up to 5
 gallons with cold tap wat
er. Stir in yeast"
  880 PRINT"2) Place bin to
 stand for 14 days. Everyday
 take hydrometer readings, an
d lift any brown scum from
 beer head."
  890 PRINT"3) When fermenta
tion has finished, placebin
 to stand on a cold floor for
 2 days.This ensures the sed
iment settles."
  900 PRINT"4) Lay bottles o
ut on table, adding halfa te
aspoon of sugar to each bott
le. If this proves tricky,
 mix 20 spoonfuls in a jug
 with some of the beer, then
 add anequal amount to each
bottle."
  910 PRINT"5) Fill each bot
tle slowly and cap each on
e firmly. Stand bottles for
2 - 5 daysin warm cupboard f
or secondary fermentation.
```

```
  920 COLOUR129:COLOUR0:PRIN
TTAB(12,31)"Press space bar"
;:COLOUR128:COLOUR1:REPEATUN
TILINKEY(-99):ENDPROC
  930 IF ERR=17 THEN RUN
  940 VDU7:PRINT"Recipe fi
le not created.":PROCpause:R
UN
  950 DEFPROCcreate:VDU7:PRI
NT"Creating new Recipe Fil
e...";:CH%=OPENOUT"Recipes":
ENDPROC
  960 DEFPROCprint:CLS:PROCc
sr(1):PROCheader("Print a Re
cipe"):*FX21
  970 INPUT"Beer type ",t
$:INPUT"Beer name ",n$:PRI
NT"Please wait...";
  980 CH%=OPENUP"RECIPES":RE
PEAT:REPEAT:PROCget:UNTIL(ty
pe$=t$ AND name$=n$)OR EOF#C
H%
  990 IF NOT(type$=t$ AND na
me$=n$) UNTILEOF#CH%:CLOSE#0
:VDU7:ENDPROC
 1000 VDU2:PROCdisplay(1):CL
S:VDU3:*FX21
 1010 REPEAT:UNTILINKEY(-99)
:UNTILEOF#CH%:CLOSE#CH%:ENDP
ROC
 1020 DEFPROCdisplay(N%):IF
N%=0 CLS:PROCcsr(0):PROChead
er(name$+" "+type$) ELSE PRI
NTname$+" "+type$:PRINTSTRIN
G$(LENname$+1+LENtype$,"-")
 1030 PRINT"OG: ";og%;TAB(
16)"FG: ";fg%;TAB(32)"VOL:
";vol%
 1040 PRINTTAB(14);:COLOUR
129:COLOUR0:PRINT"INGREDIENT
S":COLOUR128:COLOUR1
 1050 FORL%=0TO7:PRINTing$(L
%):NEXT
 1060 PRINTTAB(17);:COLOUR1
29:COLOUR0:PRINT"METHOD":COL
OUR128:COLOUR1
 1070 FORL%=0TO11:PRINTmeth
$(L%);:NEXT
 1080 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 53.

Strings and things

Part 3 of MIKE PLUMMER's series on Pascal examines input and output

SO far in this series (which started in the January 1987 issue of *Electron User*) we have seen how to enter, compile and run simple Pascal programs.

This month we will look in more detail at the structure of a Pascal program, input and output, some new data types, how strings are used in standard Pascal and some simple text file handling.

The first topic we will discuss is scope. This simply refers to how much of the program knows about any particular variable, function or procedure.

You'll know from last month that a program consists of an initial statement, followed by CONST, TYPE, VAR, various data, function and procedure declarations and then a series of statements surrounded by BEGIN and END.

Each function and procedure can also have the same structure except the initial statement is the function or procedure declaration. Look at Program I.

```
PROGRAM test (output);
CONST len = 10;
VAR x,y     : INTEGER;

PROCEDURE proc1;
CONST len = 15;
VAR y       : INTEGER;

 PROCEDURE proc2;
 CONST len = 20;
 BEGIN
  x:=len;
  writeln('Proc 2 ',x,y)
 END;

BEGIN
 y:=1;
 proc2;
 x:=len;
 writeln('Proc 1 ',x,y)
END;

BEGIN
 y:=-1;
 proc1;
 x:=len;
 writeln('Main   ',x,y)
END.
```

Program I

When you compile and run this you will see that the integer *num* is set to the value of the constant *len* which is most local to it. Also the procedure *proc2* is only known to *proc1* as it is contained within it, and it would be an error to refer to it in the main program.

You can nest procedures or functions like this to a level determined by the version of Pascal you are using. Also, the integer *x* is the same variable in both procedures.

The main program and the integer *y* – declared within *proc1* – is only recognised by *proc1* and *proc2*, whereas *y*, declared in the main data, is only recognised by the main program.

If you find this all rather confusing, think of it as like defining a local variable within a Basic procedure.

This can be summed up simply by saying that any item you use in Pascal must be declared first, and the latest declaration is the one that is used at any time.

Once the block containing the declared variables is left, that variable is removed from the program, like a Basic local variable.

Also important in Pascal is the block structure and compound statements. Anyone familiar with Basic will recognise:

```
IF num<0.0 PRINT "Negative":n
um=0 ELSE num=SQR(num)
```

The equivalent in Pascal is shown in Listing I.

This can also be written on one line if you like, but is much clearer when split over several. If more than one statement is to be called if the condition is true (or called within a loop), they must be surrounded by the BEGIN and END keywords.

```
IF num<0.0 THEN
BEGIN
 WRITELN('Negative');
 num:=0.0
END
ELSE
 num:=sqrt(num);
```

Listing I

Only one statement is called after the ELSE and so this does not need a BEGIN and END. Also the semicolon is used to separate the individual statements within the compound one – the BEGIN/END.

There are many examples of both structures in the longer, more complex program listing on the next page.

Being a block structured language, Pascal is very easy to form into modules, that is, procedures and functions.

Anyone who has written a large program in BBC Basic will know the advantages of breaking up the code into more manageable portions which can be tested individually.

When you pass a parameter to a Basic procedure, it becomes what is essentially a local variable, and any change made to it will not affect any variable outside the procedure.

All the examples of Pascal parameter passing you have seen so far are the same as this.

This is usually an advantage, but if you think for a minute, how would you write a procedure to read the length of three sides of a triangle and return them to the main program?

If there was only one side you could use a function to return its length, but what about three sides? The answer to this is shown in Program II.

By using the VAR before the parameters *s1,s2,s3* in the declaration of procedure *rd* they are said to be passed by *reference*. This means that any changes made to them within the procedure are passed back to the calling program.

This is achieved by effectively passing the address of the variable rather than its value, although the programmer does not need to know about that.

The final listing – Program III – shows how this facility is used in the function *readbuf*.

Program II also introduces several other items of interest. This is the first time we have come across the REAL data type.

As in Basic, a real number is represented by five bytes and can take a value of between –1.7E38 and +1.7E38, whereas integers are represented by four bytes and take values

between –2147483648 and 2147483647.

We have already seen WRITE and WRITELN before, and in many ways they are similar to the Basic command PRINT.

Unfortunately there is no space to describe them in much detail – this is done very well in the manuals and I would only be repeating them. However, you can see how the output is formatted from the examples here.

You may have already noticed in last month's issue how to specify the number of digits and spaces required when outputting integers, by following the variable name with a colon and the number of characters required.

For real numbers, a second colon and number sets the number of decimal places printed.

There are default values for all of the field widths, and you do not have to follow a variable name by a formatting field if you don't want to.

Formatting only applies to output to TEXT files, and we will see some other types of file next month.

One other feature of the above program are the functions READ and READLN. These are Pascal's equivalent of Basic's INPUT or GET$.

READ, when applied to a text file and the default input channel (the keyboard) can read in numbers in Ascii digits and convert them to actual numbers, and can also read characters.

READ expects the numbers input to be separated by commas or placed on a new line.

READLN will read as much of the input as will satisfy the parameters and ignore the rest on that line. It must also be called to clear the end of the line.

Note that you cannot check for the Return key pressed, but must use the function eoln(input) instead. A similar check is used for end of lines in a disc or tape file.

The function eoln is of a new type called Boolean, and can only return the values TRUE or FALSE.

Files are opened for reading using RESET and for writing using REWRITE, as can be seen in the final listing.

Note that a file variable must be the first parameter in a READ or WRITE statement, and if there is none, then input from the keyboard and output to the

Turn to Page 58 ▶

```
PROGRAM WORDS (input,output,wordfile);

(* This programs read the text in a
   text file and prints out the number
   of characters, words and lines.

   M.J.Plummer (c) Electron User *)
CONST
 longline = 255;
 namelen  = 80;(* Change for nonADFS *)
 displen  = 40;

TYPE
 llen     = 1..longline;
 linebuff = PACKED ARRAY [llen] OF CHAR;
VAR
 buffer   : linebuff;
 filename : linebuff;
 linelen  : llen;
 wordfile : TEXT;
 cc,wc,lc : INTEGER;

(* Function which reads in a string
   from the given input and returns
   the number of characters read *)

FUNCTION readbuf (VAR infile : TEXT ;
     VAR buf : linebuff ) : INTEGER;

VAR
 length   : INTEGER;

BEGIN
 FOR length:=1 TO longline DO
   buf[length]:=' ';
 length:=1;
 WHILE (length<longline) AND
   NOT EOLN(infile) DO
 BEGIN
  READ(infile,buf[length]);
  length:=length+1
 END;
 readbuf:=length;
 READLN(infile)
END;

(* Function which analyses a line and
   calculates how many words in it *)

FUNCTION analyse(buf:linebuff;
num:llen) : INTEGER;

VAR
 ptr,count : INTEGER;

BEGIN
 IF num<longline THEN
  num:=num+1;
 count:=0;ptr:=1;
 WHILE ptr<num DO
 BEGIN
  WHILE(buf[ptr] IN [CHR(9),' '])
        AND (ptr<num) DO
   ptr:=ptr+1;
  IF ptr<num THEN
   count:=count+1;
  WHILE(NOT (buf[ptr] IN [CHR(9),' ']))
        AND (ptr<num) DO
   ptr:=ptr+1
 END;
 analyse:=count
END;

(********** Main Program ***********)

BEGIN
 MODE(6);
 wc:=0; lc:=0;cc:=0;
 WRITELN; WRITELN;
 WRITELN('              Word Counter');
 WRITELN('              ============');
 WRITELN;

 WRITE('File : ');
 IF readbuf(input,filename)>namelen THEN
   WRITELN ('Filename is too long')
 ELSE
 BEGIN
  RESET (wordfile,filename);
  WHILE NOT EOF(wordfile) DO
  BEGIN
   linelen:=readbuf(wordfile,buffer);
   cc:=cc+linelen;
   wc:=wc+analyse(buffer,linelen);
   lc:=lc+1;
   WRITE('.')
  END;
  WRITELN;WRITELN;
  WRITELN('Characters = ',cc:5);
  WRITELN('Words      = ',wc:5);
  WRITELN('Lines      = ',lc:5)
 END
END.
```

Program III

```
PROGRAM sides(input,output);
VAR side1,side2,side3  : REAL;

PROCEDURE rd ( VAR s1,s2,s3 : REAL );
BEGIN
  WRITE ('Enter 3 lengths :');
  READLN (s1,s2,s3)
END;

BEGIN
  rd(side1,side2,side3);
  WRITELN('Sides are ',side1:5:2,' : ')
  WRITE(side2:5:2,' : ',side3:5:2)
END.
```

Program II

Programming

◀ *From Page 57*

screen are assumed respectively.

Finally, we come to string handling in Pascal. In ISO Pascal level zero, which is the version in the Acornsoft rom, can only be described as painful.

You have already seen string constants in the examples surrounded by single quotes. String variables in their simplest form are declared as follows:

```
TYPE string=PACKED ARRAY
[1..8]
              OF CHAR;
VAR name   :  string;
```

This brings up several issues. Firstly, arrays are declared as shown, with the subrange after the declaration showing the size.

The first value in this range need not be one, but can be zero, –1 or any integer you like. Obviously, the final value must be greater than the first. The PACKED keyword tells the compiler to optimise the memory space used, even at the expense of processing speed. Strings must be PACKED ARRAYS.

You can set a string variable to a constant value as in Basic's

```
name$="Fred"
```

However, in level zero Pascal, you cannot say:

```
name:='Fred';
```

because name is an array of dimension eight and Fred is a constant of dimension four. The correct way to write this is:

```
name:='Fred    ';
({TT}* Four spaces *)
```

Similarly, you cannot say:

```
IF name='Fred' THEN ...
```

– you must say:

```
IF name='Fred    ' THEN ...
```

Also, when you pass strings as a parameter to a procedure it must be of the correct dimension and subrange.

You cannot return strings from a function in standard Pascal, and so you have to pass the string parameter by reference.

You will be pleased to know however, that almost every other version of Pascal, as well as having these facilities, has much better string types and functions.

These are not standard, and so you must learn the string handling for each version.

Now look at the final listing, Program III. This will read text from a disc or tape file (if you do not have View, you can use the Pascal editor to generate a file) and count the characters, words and lines within that text file.

It uses all of the concepts we have already discussed, the only extra thing being the EOF function, which is the same as the Basic EOF#, except that it is a Boolean function and returns values of TRUE and FALSE.

Note that the TEXT file variable is also declared in the PROGRAM statement, as well as in the VAR section.

● *Next month we will look at structured data types and some more features of file handling, along with some other important ideas. As an example, I'll list a program which will allow you to maintain a record of the weather.*

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HAVE you ever been lost and stopped to ask a passer-by how to get to your destination? If so, no doubt you'll have been told the way, with the addition of "But I wouldn't start from here".

Well assembly language is a bit like that. There's no obvious place to start.

Not that it's difficult. It isn't. It's just that before you can use it properly, there seem to be a lot of things that you have to know... Binary and hexadecimal, obscure operating system calls, memory maps, registers, interrupts...

There's a bewildering list of things that can creep into discussions of assembly language. To the novice it can seem overwhelming.

It needn't be. You don't have to be a genius to learn assembly programming – look at some of the half-wits who do it (I'll send a signed photo on receipt of an SAE).

All you have to do is to take it bit by bit and don't be diverted by the obscurities you'll come across from time to time.

Take them on trust and come back to them later when you're more at home with things. Just concern yourself with the essentials and you'll realise how easy assembly language is.

Silicon heart

You're already familiar with some of the basic concepts you'll need, even if you don't realise it.

You know that your Electron has 64k of memory. You also know it's got a silicon chip at the heart of things, the 6502 (politely known as the Central Processing Unit or CPU). This is the brains of the micro.

With these two concepts you can get to grips with assembly language.

The classic model of a computer's memory is as a series of pigeon holes – locations – which are used to store things. A more accurate description is as an ordered collection of one byte locations, each identified by its own unique address.

Locations

If you've done a bit of Basic programming then you can look on the memory as a one-dimensional array of one byte elements, with the array index being the location's address.

The Electron has 65,536 of these locations which is an awfully big array or a huge flock of pigeons depending how you look at it.

So what, you might ask, is in these memory locations? That's the fundamental question. As you delve further into machine code you'll seem to spend your life wondering just what is in a location and how it got there.

At its simplest, all that can go into a location is a number. And this number can only take values between zero and 255. A machine code program consists of a whole set of these numbers one after the other in memory.

When it's given the electronic equivalent of a kick start, the CPU takes a peek at the first location it's pointed at and starts to run the program.

To be precise, it drags the contents of that location from memory and puts it in one of its registers (a sort of electronic notepad) while it tries to figure out what it's supposed to do next.

This number is an instruction, a code that gets the 6502 chip to do something. In fact almost everything that your Electron does is the result of obeying instructions taken from memory.

Actually most instructions need something else as well. Suppose I instructed you to add. You'd probably ask "add what to what?".

The facts, man

The 6502 is just the same. Most of its instructions need data to act on and this data is stored as numbers in memory. When the chip decodes an instruction it looks in the memory for any data it needs and brings it into its registers to work on.

Obviously there's a lot more to it than that, but if you grasp the fact that a machine code program consists of a series of numbers tucked away in a series of memory locations, with some of these numbers being instructions and others being data, then you're well away.

Now these numbers aren't stored in our everyday decimal format. The micro uses binary, which looks like a lot of zeros and ones all strung together.

To make things easier for themselves, machine code programmers decided to write down the numbers in hexadecimal notation.

These op codes, as they are known, are still conver-

Turn to Page 60 ►

ASSEMBLY OR MACHINE CODE

To be pedantic, machine code is the binary representation of a program's instructions and data, the actual raw material the CPU processes.

An assembly language program is a program written entirely in mnemonics. This is translated into machine code by way of an assembler program.

The assembly program is known as the source code, with the assembled machine code being called the object code. In practice, the term machine code is used loosely for both.

Programming

◄ *From Page 59*

ted to binary (or rather, its electronic representation) for use by the micro, hexadecimal just being used to make things easier for the programmer. After all:

```
4A 19 28
```

which is hexadecimal, is a lot easier to handle than the binary:

```
01001010 00011001 00101000
```

even if you don't know what it means in either case.

It gets even simpler if you replace the hexadecimal with assembly language mnemonics. These are easier to use than spell. They're shorthand terms for the instructions.

Allegedly more meaningful and so more memorable, they stand for the op codes. Even though you know nothing about assembly language you should be able to grasp that:

```
ADD 25,48
```

means that 25 and 48 (in decimal) are to be added. It's a lot better than the hexadecimal and binary equivalents we just met.

In fact all machine code programs are written in assembly language and then translated into hexadecimal values which computers store as binary numbers. (Incidentally, I made the earlier ones up, no CPU will run them).

At first, programmers used to use tables to translate the mnenomics into hex values and then, believe it or not, flick switches to set each byte in memory manually.

It didn't take long before it dawned on someone to write a program to do it for them. Hence the first assembler was born.

An assembler is a program that takes a listing written in those helpful mnemonics (easy for humans to grasp) and converts it into binary (which the computer can understand), storing it in memory, ready to run.

You start the assembler, give it your assembly language program (the mnemonics) and you get machine code in return.

Assemblers do a whole lot more as well, and it often seems that you have to spend more time learning the ins and outs of your assembler than you do to learn assembly language programming itself.

Having said that, the joy of the Electron is that Basic has a built-in assembler which makes things much easier.

Again, you're best advised to stick to the basics (which is not the same as sticking to Basic!) and leave the complications for later.

● *Which is almost where we came in. If I were you, I'd start from here. Next month in Part 2, we'll start assembly language programming.*

Why program in assembly language?

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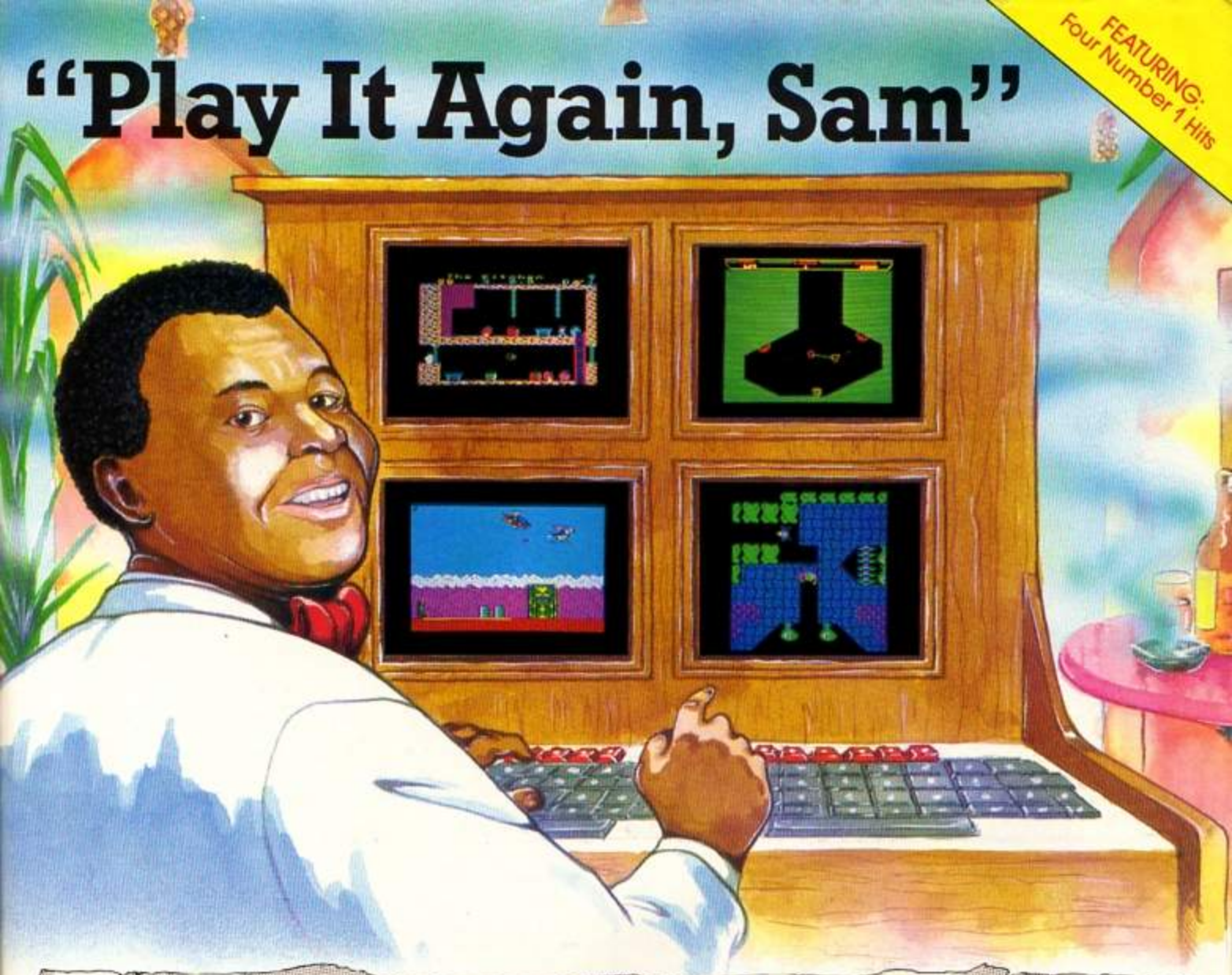

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